NON-COGNITIVE ATTRIBUTES: CORRELATIONS TO HIGH ABILITY STUDENTS'ACADEMIC ACHIEVEMENT

A DISSERTATION

SUBMITTED TO THE GRADUATE SCHOOL

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE

DOCTOR OF EDUCATION

BY

ALICIA J. CLEVENGER

DISSERTATION ADVISOR: DR. MARILYNN QUICK

BALL STATE UNIVERSITY

MUNCIE, INDIANA

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BALL STATE UNIVERSITY
MUNCIE, INDIANA
December 2018

DEDICATION

To my friends and co-workers. Without your support and inspiration, I would not have been able to complete this project. Thank you for listening, letting me cry, and laughing with me. You truly do inspire me to be the best administrator I can be. Thank you for your friendship.

Mom and Dad. Thank you for always asking me how my school work was coming. Not even knowing it, you kept me going. You both have instilled in me the work ethic that you have. Without that work ethic, this process would have been impossible. I love you both very much!

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

INTRODUCTION

High ability education differs across the United States. The National Association for Gifted Children (n.d.) describes a child as "gifted when their ability is significantly above the norm for their age" (para. 1). Locally, the Indiana Department of Education utilizes Indiana Code 20-36-1 (Rund, 2017) to describe a high ability student as one who performs "at an outstanding level of accomplishment" (para. 3). In today's education, high ability students are expected to academically achieve and reach their full potential. Some of those who teach high ability students are finding it more difficult to demonstrate their students' academic achievement (Rubenstein, Siegle, Reis, McCoach, & Burton, 2012). Additionally, teachers of high ability students need to address the affective constructs of their students that impact academic achievement (National Association for Gifted Children, 2010). Self-efficacy, intrinsic motivation, grit, and growth mindset are non-cognitive attributes that may play a role in how high ability students academically achieve.

The topic of addressing non-cognitive attributes of self-efficacy, intrinsic motivation, grit, and growth mindset seems to be a trend in education today. Moreover, teachers are contending with how to instill these non-cognitive attributes in their students to promote increased learning and academic achievement. Self-efficacy, the belief in one's ability to begin and continue a task needed to achieve an expected result (Bandura, 1977), has been found to positively influence academic achievement and it can also influence underachievement (Phan, 2012; Usher, 2009). However, self-efficacy has been found to influence the effort students make and their perseverance when they encounter academic challenges (Pajares, 1996). A better

understanding of how self-efficacy affects students' learning patterns is essential for educators to effectively implement instructional practices that promote academic achievement in high ability students. Intrinsic motivation is more directly correlated with classroom engagement and other non-cognitive attributes as opposed to having a direct relationship with academic achievement (Clinkenbeard, 1996; Froiland & Worrell, 2016; Mega, Ronconi, & De Beni, 2013). Grit has been connected to other non-cognitive attributes, such as self-efficacy (Dixson, Worrell, Olszewski-Kubilius, & Subotnik, 2016) and growth mindset (Perkins-Gough, 2013; Dockterman & Blackwell, 2014). How grit correlates to these non-cognitive attributes may play an important role in high ability students' academics. Growth mindset has been positively correlated with academic achievement. Research has indicated that high ability students see their ability separately from their intelligence (Makel, Snyder, Thomas, Malone, & Putallaz, 2015). If this is the case, then growth mindset may play a vital role in high ability students' approach to handling challenging academic tasks, effort, and thus, affect academic achievement. Grit, on the other hand, has not been directly correlated to academic achievement. These affirmations provide a foundation for obtaining further knowledge of what educators can do to cultivate classroom engagement and to nurture other non-cognitive attributes in high ability students so they can build or sustain intrinsic motivation. Not only is the topic of these non-cognitive attributes trending, but the need to address them is as well.

More and more teachers are finding that high ability students are lacking self-efficacy, intrinsic motivation, grit, and growth mindset. Because of this, high ability students may not be willing to take academic risks in order to learn more. Their response is to avoid challenging tasks so they do not experience failure (Dweck, 2012). Dockertman and Blackwell (2014) stated that students must have the ability to self-regulate and persevere in the face of challenge because

it is a vital factor in student academic achievement and life success. However, teachers that foster grit (passion and perseverance) may not be successful if students do not have the growth mindset or strategies they need to motivate and support their academic growth.

High ability students have the potential to make contributions to society by solving problems and making improvements in their chosen careers. It is unfortunate, however, when some high ability students do not reach their potential, which not only has ramifications for them, but also for our society. Ritchotte, Matthews, and Flowers (2014) acknowledged this when they stated "gifted underachievement represents a frustrating loss of potential for society" (p. 183). Underachievement and non-cognitive attributes have been identified as obstacles that contribute to academic disengagement and prevent high ability students from reaching their full academic potential (Esparza, Shumow, & Schmidt, 2014). When discussing general education students, Siegle and McCoach (2005) affirmed that students with growth mindset are less likely to manifest academic underachievement than those students who have a fixed mindset. Dweck's studies (2007, 2010, 2012) have shown that teaching general education students about growth mindset can have positive effects on academic achievement. How do growth mindset and other non-cognitive attributes relate to identified high ability students? Landis and Reschly (2013) indicated that academic engagement is an intricate construct that encompasses characteristics of emotion, behavior, and cognition. Non-cognitive attributes may be the keys to unlock the doors of opportunity for high ability students to deeply engage in academics, grapple with academic challenges, and consequently, reach higher levels of academic achievement and contribute to society.

Statement of the Problem

The underachievement of identified high ability students is an increasingly perplexing circumstance. Van Tassel-Baska (2000) reported that 63% of high ability students are underachieving. Additionally, Landis and Reschly (2013) conveyed the startling occurrence of underachieving high ability students' disengagement in school and consequential dropout rates. Most recently, the Indiana Department of Education (IDOE) reported that identified high ability students in grades 3 through 8 earning Pass+ on the 2017 Indiana Statewide Testing for Educational Progress-Plus (ISTEP+) examination was an average of 65.2% in English Language Arts and an average of 58.5% in math.

Researchers from NWEA completed a concordance study (2017) to connect the scales of ISTEP+ with those of the MAP Reading and Map Math assessments. In that 2017 report, readers are able to see the consistency of predictability of receiving Pass+ on ISTEP+. For reading, students with a MAP score in the range of 86th to 99th percentile are predicted to earn Pass+ on ISTEP+. The range for math is slightly larger; students scoring from 81st to 99th percentile are predicted to earn Pass+. Typically, Indiana school districts will use a NWEA benchmark average of the 90th percentile when identifying students for high ability programming. It seems, then, that more identified high ability students should be scoring Pass+ on the state assessment. Additionally, the IDOE (2017) recommends that 90% of a school district's high ability students earn Pass+ on ISTEP+ as indicated on a school district's high ability report card. Why are high ability students not achieving to their potential? While high ability students vary in cognitive ability, they can also vary in the non-cognitive attributes they possess, which include self-efficacy, intrinsic motivation, grit, and growth mindset (Clinkenbeard, 1994, 1996, 2012; Duckworth, 2016; Duckworth & Gross, 2014; Duckworth,

Peterson, Matthews, & Kelly, 2007; Dweck, 2006, 2007, 2010; Pajares, 1996, 1997). If educators promote these non-cognitive attributes while they teach high ability students, will that facilitate more learning and academic growth?

Conceptual Framework

The conceptual framework for this study integrates two theoretical frameworks based on studies conducted by researchers including Angela Duckworth (grit) and Carol Dweck (growth mindset). Grit and growth mindset have shown correlations to academic achievement (Duckworth, 2016; Duckworth & Gross, 2014; Duckworth et al., 2007; Dweck, 2006, 2007, 2010). Furthermore, the interplay of these non-cognitive attributes has effects on academic achievement. How non-cognitive attributes may influence high ability student academic achievement can be complex; however, common themes and key concepts connect the two non-cognitive attributes in this conceptual framework. More development of the conceptual framework can be found in Chapter Two.

Purpose of the Study

The purpose of this study was to determine what non-cognitive attributes correlate with academic achievement of identified high ability students in fourth through eighth grades while controlling for the intervening variables of teacher feedback, student self-regulation, and goal orientation. The independent variables were the non-cognitive attributes of grit and growth mindset. The dependent variables were the measurements from student and teacher responses obtained from a five-point Likert scale survey and the students' Northwest Evaluation Association (NWEA) achievement scores.

Research Questions

Given the purpose of this study was to quantify which non-cognitive attributes correlate with high ability students' academic achievement, the research had a central question with sub-questions that guided my investigation of data collection. The central, or overarching question, guiding this study was:

1. What amount of variance do growth mindset and grit have on high ability students' academic achievement as measured by NWEA scores?

The following sub-questions guided research and data analysis for this study:

2. What amount of variance do growth mindset and grit have on high ability students' academic achievement while controlling for teacher process feedback?
3. What amount of variance do growth mindset and grit have on high ability students' academic achievement while controlling for time spent teaching student self-regulation?
4. What amount of variance do growth mindset and grit have on high ability students' academic achievement while controlling for time spent with students on their individual goal setting?

Significance of the Study

The significance of this research can be classified into two categories: scholarly research and instructional practice in the area of high ability education. The significance includes: (1) a contribution to needed research specifically regarding non-cognitive attributes of high ability students; (2) potential data for reducing underachievement in high ability students, which is of concern to high ability educators; and (3) implications for instructional practice that promote

non-cognitive attributes. Examining the non-cognitive attributes of high ability students will be beneficial in a number of ways.

With respect to the scholarly research, this quantitative study will provide information about high ability students' academic achievement in relationship to their non-cognitive attributes. Even though significant research is available on general education students' non-cognitive attributes and academic achievement (Blackwell, Trzesniewski, & Dweck, 2007; Cassidy, 2015; Claro, Paunesku, & Dweck, 2016; Dev, 1997; Dockterman & Blackwell, 2014; Duckworth et al., 2007; Dweck, 2012; Froiland & Worrell, 2016; Golden, 2015; Gottfried, 2008; McGeown, Putwain, St. Clair-Thompson, & Clough, 2016; Pajares, 2003; Phan, 2012; Rattan, Savani, Chugh, & Dweck, 2015; Ricci, 2013; Rimfeld, Kovas, Dale, & Plomin, 2016; Usher, 2009), many scholars believe more research is needed with particular regard to high ability students (McCoach & Siegle, 2003; Reis & McCoach, 2000; Rubenstein et al., 2012). Scholars cited research on high ability students' non-cognitive attributes of self-efficacy (Pajares, 1996; Wang & Neihart, 2015), intrinsic motivation (Clinkenbeard, 1996; Gottfried, 2008; Gottfried & Gottfried, 1996), grit (Duckworth, et al., 2007), and growth mindset (Dweck, 2010, 2012; Esparza et al., 2014; Snyder, Barger, Wormington, Schwartz-Bloom, & Linnenbrink-Garcia, 2013), but have suggested additional research be conducted to discover the unknowns between research and instructional practice.

With regard to instructional practice, this study will contribute to the existing body of knowledge in education by examining how non-cognitive attributes correlate with high ability students' academic achievement and how teacher feedback, student self-regulation, and goal orientation may influence those non-cognitive attributes. Quantitative data will demonstrate if non-cognitive attributes explain a significant amount of variance of high ability students'

academic achievement as measured by NWEA data. This study will serve as a prognostication for educators of high ability students to formulate grit and growth mindset, acknowledge the roles each plays in academic achievement, and implement best instructional practices that foster the non-cognitive attributes shown to correlate with academic achievement.

High self-efficacy is likely to promote better academic performance via students' non-cognitive attributes. Further research will help educators have a better understanding of how self-efficacy correlates with academic achievement. Intrinsic motivation is more directly correlated with non-cognitive attributes such as students' implicit beliefs, self-efficacy, and learning goals that play an essential part in intrinsic motivation and promote and sustain academic achievement (Mega et al., 2013). Although grit has been connected to other non-cognitive attributes, grit studies have included limited populations as Duckworth has examined the effects of grit on spelling bee participants and West Point cadets (Duckworth et al., 2007). Additional research is needed to identify if grit correlates with academic achievement in high ability students and to help our practice in supporting the development of grit in high ability students. Carol Dweck (2007, 2010, 2012) has led the way on the current interest surrounding the non-cognitive attribute of growth mindset. As educators are concerned about high ability students not meeting their academic potential, Dweck's work regarding implicit beliefs about intelligence has relevance in terms of how to motivate high ability students to achieve their academic potential. Snyder et al. (2013) reported high ability students have a tendency to believe their intelligence is malleable, suggesting the high ability label is not as maladaptive for a fixed mindset as has been proposed by theoretical perspectives. If teachers understand that high ability students have a tendency toward a growth mindset, this study can improve practice because it will provide data specific to high ability students that can be used to determine best

instructional practices to promote growth mindset in high ability students. These affirmations provide the groundwork for obtaining further knowledge from this study so educators will be able to apply interventions aimed at enabling high ability students to handle the demands of academic performance and achievement.

Definition of Terms

The terms below can be found frequently in this study and in the review of literature.

Academic achievement: Academic achievement is success as measured by a student's NWEA RIT score.

Full potential: In this study, full potential is the high ability student's demonstration of growth and continuous academic progress, extending beyond current levels of proficiency or achievement (Gallagher & Gallagher, n.d.).

Goal orientation: Goal orientation represents the foundation of goal setting. Two goals that have extensive research with regard to their effects on academic achievement are performance goals and learning goals. Performance goals, often called ability goals or ego-involved goals, validate a student's ability or avoid demonstrating a lack of ability. Learning goals, also called mastery goals, on the other hand, are those where a student seeks to obtain new knowledge (Grant & Dweck, 2003; King, McInerney, & Nasser, 2017).

Grit: Angela Duckworth (2016) defined grit as the passion and perseverance for long-term goals. For the purpose of this study, that definition will be utilized; however, grit will also be considered as working persistently toward challenges, continuing effort despite failure and adversity in academic progress.

Growth mindset: Growth mindset is the belief that intelligence is malleable, that is, it can be developed over time (Dweck, 2012).

High ability student: The term *high ability* will refer to the Indiana Code 20-36-1 (Rund, 2017) definition pertaining to student performance or potential at an outstanding level of accomplishment in at least one domain when compared to others of the same age, experience, or environment and is characterized by exceptional gifts, talents, motivation, or interests. In practice, this can be a student who performs at or above the 96th percentile (using local or national norms, whichever are more inclusive) in language arts, math, or general intellectual designation.

Intrinsic motivation: Intrinsic motivation is described as the enjoyment of the learning process without receiving external or extrinsic rewards or consequences. For example, students who participate in an activity purely for the sake of gaining more knowledge are intrinsically motivated (Dev, 1997; Gottfried, 2008).

Non-cognitive attributes: Non-cognitive attributes are sets of behaviors, skills, attitudes, and strategies that impact students' academic performance (Nagaoka, Farrington, Roderick, Allensworth, Keyes, Johnson, & Beechum, 2013).

NWEA RIT Score: A RIT score is a student's overall scale score on the test for a given subject.

Self-efficacy: Self-efficacy refers to a student's belief in his or her capability to successfully perform academic tasks (Pajares, 1996).

Social emotional characteristics: Social emotional characteristics are the affective traits, which could include perfectionism and sensitivity (Blaas, 2014).

Student self-regulation: Self-regulation refers to the process by which students control their own behaviors, cognition, and motivation (Day & Connor, 2017).

Teacher feedback*:* Teacher feedback refers to the messages that students receive from teachers that may include intelligence praise or process praise.

Underachievement*:* Underachievement is described as a discrepancy between ability and performance (Blaas, 2014; McCoach & Siegle, 2003).

Assumptions and Delimitations

Assumptions were made by the researcher about the population and research design for the study. It is an assumption that non-cognitive attributes may manifest differently across grade levels and ethnic groups of the students. An assumption was made based on the research questions for the study that the participants will have experiences and perceptions related to the instructional practices of teacher feedback, self-regulation, and goal setting. Although the teachers' self-report is likely going to be different from what may be observed in the classroom, the researcher assumed all study participants would reply truthfully to all survey questions.

Factors that the researcher may impose on the study can narrow the scope. In this particular study, the researcher limited the participants to students in grades 4 through 8 that have been identified as high ability in Indiana and their teachers. Not all of the public school corporations in Indiana administer NWEA to their high ability students. Therefore, this limited the pool of participants as only identified high ability students who take the NWEA test were surveyed in this particular study. The researcher was confident that the student sample will generalize to the population of high ability students in Indiana. The focus of the student survey included the two non-cognitive attributes of growth mindset and grit and did not include self-efficacy and intrinsic motivation, nor encompassed all other factors that could potentially influence student academic achievement. Similarly, the focus of the teacher survey included

teacher feedback, time spent teaching student self-regulation and goal setting and did not include other instructional strategies that can be used with high ability students.

Summary and Organization of the Study

Chapter One has presented the necessity of analyzing what non-cognitive attributes may correlate with academic achievement in high ability students. Additionally, the need to analyze which non-cognitive attributes correlate with high ability students' academic achievement while controlling for teacher feedback, student self-regulation, and goal orientation has been presented. This knowledge will allow educators to design appropriate interventions and teaching strategies that promote non-cognitive attributes and academic achievement in high ability students. Basic assumptions and limitations have been presented. Chapter Two will set forth the foundation of the literature review for this study.

The study is organized into five chapters, a bibliography, and appendices. Chapter Two presents the literature review providing a foundation and analysis of underachievement in high ability students, non-cognitive attributes, teacher feedback, and instructional practices. Chapter Three will outline the research design, population of the study, sampling procedures, instrumentation, data collection, and analysis. Chapter Four will submit an analysis of the data and discussion of the findings. The summary, conclusion, implications for practice, and recommendations for further research will be presented in Chapter Five.

CHAPTER TWO

LITERATURE REVIEW

Recently, educators have directed more attention to children's non-cognitive attributes based on their connection to academic achievement (McGeown et al., 2016). Hareli and Weiner (2002) described non-cognitive attributes as self- and other-directed emotion and personality inferences. Non-cognitive attributes are considered the "real ingredients" (Dweck, 2006, p. 56) to academic achievement. They are why some students underachieve and why some students achieve more than expected. Because there is not one non-cognitive attribute that exclusively correlates with academic achievement, it is important for educators to consider non-cognitive attributes as an alternative pathway to better understand why some high ability students do not reach their full potential.

One definition of high ability does not exist as many researchers believe that being intellectually gifted entails more than having a high IQ or being identified as the top 20% to top 5% of a school population (Robinson & Clinkenbeard, 1998). Indiana Code 20-36-1 (Rund, 2017) defines a high ability student as one "who performs at, or shows the potential for performing at, an outstanding level of accomplishment in at least one (1) domain when compared to other students of the same age, experience, or environment; and (2) is characterized by exceptional gifts, talents, motivation, or interests" (para. 3). Although there is not one definition of high ability that experts agree upon, definitions of high ability include the constructs of intelligence and motivation, a non-cognitive attribute that will be discussed in this review.

This review will provide background on the social-emotional characteristics of high ability students and discuss the following: underachievement in high ability students and non-

cognitive attributes, including self-efficacy, intrinsic motivation, grit, and growth mindset. This study will particularly focus on grit and growth mindset and how those correlate with academic achievement. The researcher will also consider teachers' feedback, student self-regulation, and goal orientation that may moderate the effects that non-cognitive attributes have on high ability students' academic achievement.

Conceptual Framework

Researchers have provided a conceptual framework for this study. First, achievement goal theory encompasses the constructs of self-efficacy, intrinsic motivation, and grit. Wolters (2004) stated achievement goal theory suggests that students' achievement-related behaviors can be understood by considering the reasons why students engage in academic work. Students may adopt performance or mastery goal orientations. Students who adopt performance goals focus on demonstrating their ability or proving their self-worth. If they adopt mastery goals, then students focus on learning as much as possible, overcoming challenges, and increasing their competence.

Dull, Schleifer and McMillan (2015) stated that achievement goal theory also explains how the learning process combines influences from the environment, the learning context, the qualities of the student, and how this process brings about learning. Qualities, such as grit, may help students determine what challenges to undertake, how much effort to exert, how long to persevere when faced with adversities and failures, and whether the failures are motivating or disheartening. Goal orientation theories explain achievement behavior and, thus, can help educators understand and improve learning and instruction for high ability students.

Second, individuals may hold different theories about their intelligence (Blackwell et al., 2007; Dweck & Leggett, 1988; Haimovitz & Dweck, 2017), known as implicit theories of intelligence. Some believe intelligence is a malleable trait that can be developed over time,

which is referred to as growth mindset. On the other hand, those who support an entity theory tend to orient toward measuring ability and give up if they expect an undesirable outcome. A fixed mindset increases students' concerns about how smart they are, creates anxiety about challenges, and makes failures into a measure of intelligence that will result in defensive and vulnerable behaviors that worsen with performance (Ahmavaara & Houston, 2007).

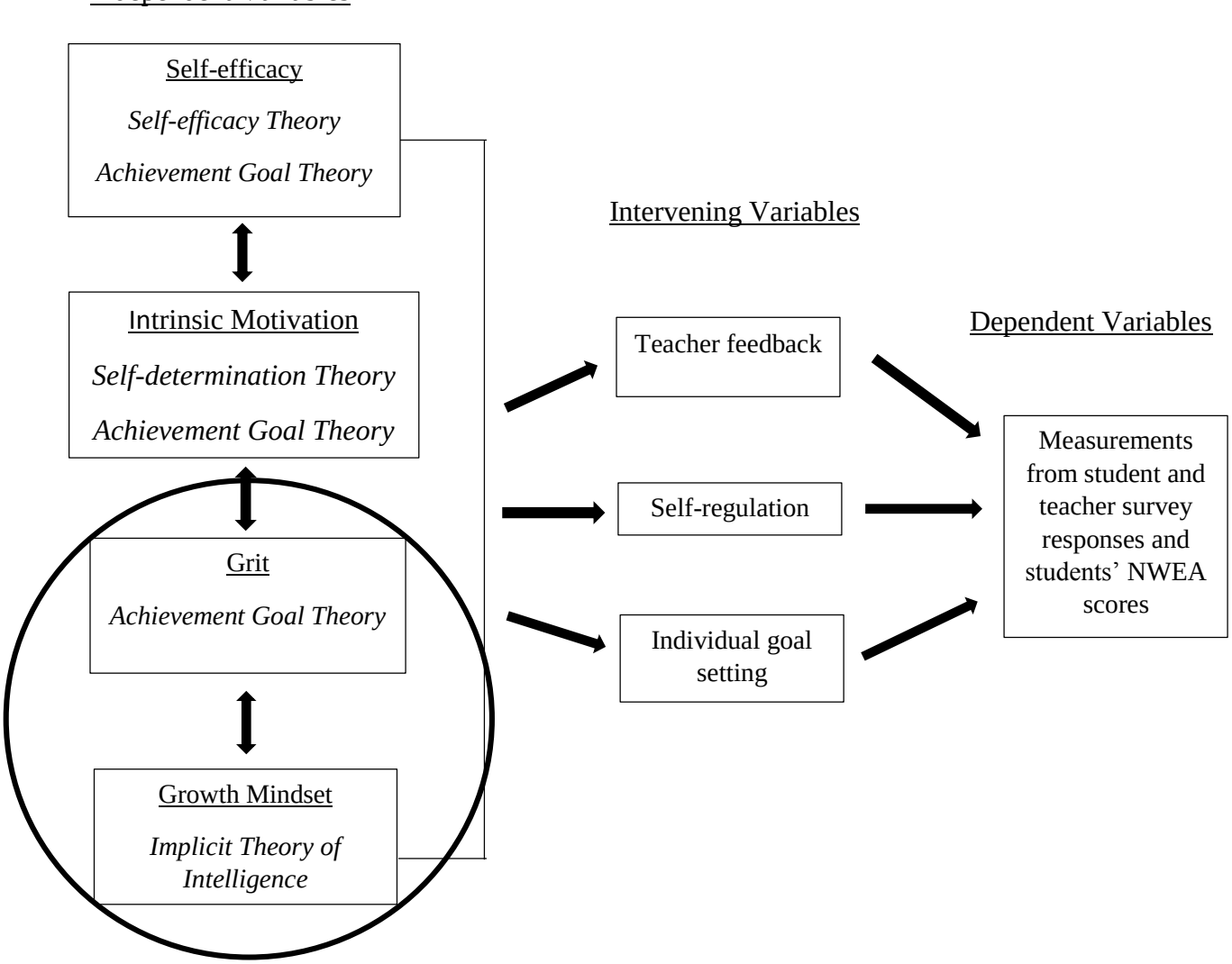
Children with a fixed mindset believe they have a certain amount of intelligence and cannot do much to change it. On the contrary, those with a growth mindset believe they can develop their abilities through hard work, effective strategies, and instruction from others (Blackwell et al., 2007; Dweck & Leggett, 1988). These implicit beliefs are ways that children understand themselves, which create different pathways for learning.

Achievement goal theory and implicit theories of intelligence each create pathways for learning and achievement. Demonstrating and developing ability, however, are quite different. When children focus on demonstrating their ability and fail to do so, their ability is questioned. Conversely, when children focus on developing their ability, they can remain in a mastery-oriented mode even when they struggle (Dweck, 2017). After all, struggle is a part of the learning process. But why do children identified as high ability adopt different goals? Perhaps some children care a great deal about validating their abilities while others want to focus on the goal of increasing their abilities. The interplay of goal orientation and implicit beliefs influences student learning pathways to academic achievement.

The foundation for this study is based on the constructs self-efficacy, intrinsic motivation, grit, and growth mindset and the common themes and key concepts that connect them. However, self-efficacy and intrinsic motivation go beyond the scope of this study. The conceptual framework for this study will target grit and growth mindset. The rationale for selecting these

two is that growth mindset was confirmed to be an important factor in the development of grit, and the combination of growth mindset and grit in students has been associated with higher academic achievement (Cassidy, 2015). The constructs of grit and growth mindset mesh and influence student learning as supported by the aforementioned theories. These constructs play a role in student outcomes, that is, in this study, academic achievement. Figure 1 provides an overview of the conceptual framework for this study.

Figure 1. Conceptual Framework



Method

This literature review is primarily based on searches for journal articles using OneSearch Ball State University Library, Web of Science, ERIC (EBSCOhost), PsycINFO, and Google Scholar. Keywords such as non-cognitive attribute, gifted, high ability, academic achievement, grit, growth mindset, self-efficacy, intrinsic motivation, exceptional, high-achieving, neuroplasticity, resilience, teacher praise, and self-regulation were used. Articles in peer-reviewed journals between 2007 and 2017 were searched, which led to many articles that were narrowed by reading abstracts to determine if the article met the following criteria: studies that examined the relation between non-cognitive attributes and high ability students' achievement, studies that examined effort and ability in academic settings, studies that were primarily quantitative in nature, and studies that correlated the type of teacher feedback to student academic achievement. Finally, supplemental searches of reference lists were conducted to identify additional articles that were relevant to this review that may have been overlooked in the initial search.

Social-Emotional Characteristics of High Ability Students

There has always been an interest in the social and emotional characteristics of high ability students. Perhaps that is because anti-intellectuals want to find something wrong with high ability students. Robinson and Clinkenbeard (1998) indicated that the stereotypical view of a neurotic child with poor social skills is inaccurate. However, what has been noted from research is students who are high ability may experience social isolation and are considered to be perfectionists and sensitive. High ability students can display depression, anxiety, failure-avoidance behavior, and low self-esteem. Perfectionism and failure-avoidance particularly contribute to underachievement (Blaas, 2014).

How do high ability students view their own non-cognitive attributes? Blaas (2014) reported that high ability students' responses included respect from others, feeling a sense of social stress, and generally feeling satisfied with themselves. How others view high ability students and how high ability students view themselves are not far adrift regarding social situations. However, characteristics pertaining to academic outcomes, such as self-esteem and perfectionism, differ between what others think and what high ability students think of themselves. With respect to academics, high ability students have positive views of their own self-esteem and report being highly motivated (Robinson & Clinkenbeard, 1998). On the other hand, high ability students typically do not see themselves as perfectionists.

Reports (Blaas, 2014; Fletcher & Speirs Neumeister, 2012; Robinson & Clinkenbeard, 1998; Wang, Fu, & Rice, 2012) have indicated that perfectionism in high ability students is one of the primary characteristics that influences social-emotional difficulties and academic underachievement. High ability students who are perfectionists often set unrealistic goals that become precursors to failure. Fletcher and Speirs Neumeister (2012) and Wang et al. (2012) addressed variable types of perfectionism, differing in degrees and effects on academics. That is, the more severe the perfectionism, the more detrimental effect on academic outcomes that exists. High ability students with *neurotic* (Wang et al., 2012) perfectionism are afraid of failure, which leads to task avoidance, concerns about deficiencies, and anxiety. If a high ability student who displays perfectionism fails to solve an extremely difficult task, he may show extreme irrational beliefs, greater negative affect, and more physiological stress than students who are not perfectionists (Robinson & Clinkenbeard, 1998). If a perfectionist high ability student sets unreachable goals, then he may alter other non-cognitive attributes, such as growth mindset and self-efficacy, that impact his willingness to take risks with challenging tasks.

Summary of social-emotional characteristics of high ability students.

Social-emotional characteristics, like non-cognitive attributes, interrelate with one another (Blaas, 2014; Fletcher & Speirs Neumeister, 2012; Wang et al., 2012). As an example, if a student has low self-esteem and does not perform well on a given task, that student's anxiety, sensitivity, and fail-avoidance behaviors may all increase. Perfectionism may lead to task avoidance behaviors and increased levels of other social-emotional traits. Understanding the social-emotional characteristics of high ability students provides a foundation for educators to facilitate a stronger sense of self-efficacy among high ability students who may not think they are as good as their high ability peers. Additionally, Dweck (2006) emphasized that standards should not be lowered to provide students successful experiences, but rather educators should create a classroom environment that focuses on strategies, effort, and choices. This will deter underachievement in high ability students and lead to higher academic achievement.

Underachievement of High Ability Students

Because ability and intelligence do not exclusively influence academic achievement, non-cognitive attributes also contribute to the achievement levels of identified high ability students. The underachievement of high ability students is a concern, and even frustration, for parents and educators. These students seem capable of exceptional performance, but do not recognize their potential. Van Tassel-Baska (2000) reported that 63% of high ability students are underachieving. More recently, Landis and Reschly (2013) described the significance of underachieving high ability students' disengagement and consequential dropout rates.

More specifically, research has shown achievement gaps between genders, particularly with math (Beilock, Gunderson, Ramirez, Levine, & Smith, 2010; Cheema & Galluzzo, 2013; Cvencek, Meltzoff, & Greenwald, 2011; Degol, Wang, Zhang, & Allerton, 2017). Females have

a tendency to underachieve when they are compared to their male counterparts. Else-Quest, Mineo, and Higgins (2013) indicated there are significant differences in how males and females cognitively assess their mathematical abilities. This can be connected to the research conducted by Beilock et al. (2010) when they found elementary female teachers' math anxiety tends to elicit negative consequences for girls' math achievement by influencing girls' beliefs about who is strong at math. This coincides with having a fixed mindset. The research conducted on gender and its relationship with math achievement reinforces the claim that females are still greatly underrepresented in mathematically concentrated STEM careers (Degol et al., 2017).

These issues may have significant impacts on the students and their future, as underachievement continues after high school. Underachievement is described as a discrepancy between ability and performance (Blaas, 2014; McCoach & Siegle, 2003). A strong factor that can trigger underachievement in high ability students may be the result of social-emotional characteristics, rather than a lack of ability and intelligence (Blaas, 2014; Fehrenbach, 1993; McCoach & Siegle, 2003; Obergriesser & Stoeger, 2015; Siegle & McCoach, 2005). Other factors that correlate with underachievement of high ability students include students' attitudes toward school (McCoach & Siegle, 2003; Siegle & McCoach, 2005), lack of self-regulation (Blaas, 2014; McCoach & Siegle, 2003; Obergriesser & Stoeger, 2015; Siegle & McCoach, 2005), lack of motivation (McCoach & Siegle, 2003; Robinson & Clinkenbeard, 1998; Siegle & McCoach, 2005), and fear of failure (Fehrenbach, 1993; Obergriesser & Stoeger, 2015). On the contrary, Reis and McCoach (2000) emphasized that it is difficult to identify social-emotional factors that describe high ability underachievers. For each factor common to a high ability underachiever, there are other high ability underachievers who do not exhibit that factor. Perhaps there is a composite of factors that affect high ability underachievers. Although these

factors provide educators with convenient labels for various underachievers with whom they interact, the factors also illustrate the difficulty in teaching high ability underachievers. Understanding why a particular student is underachieving may determine what type of feedback or instructional strategies should be used with an underachieving high ability student.

One factor that may lead to underachievement is self-regulation. Self-regulation refers to the ability to take control of one's own behavior (Blaas, 2014; McCoach & Siegle, 2003). Students who can self-regulate have autonomy, confidence, diligence, and are responsible for their learning (Blaas, 2014). Typically, when students use self-regulatory strategies, they are able to academically achieve more. However, McCoach and Siegle (2003) contended that those strategies are not enough to academically achieve. Students must also be motivated to self-regulate their effort in learning. If these two constructs are interrelated, then one may assume that if a student possesses the self-regulatory skills, but does not have the motivation, then that student may underachieve. Other studies indicated that self-regulated learners also tend to have high levels of self-efficacy (Blaas, 2014). Based on the evidence, students with self-regulation skills and self-efficacy are more likely to experience higher levels of academic achievement than students who cannot self-regulate their learning or have low self-efficacy.

High ability students who have low self-efficacy often will not take risks due to a fear of failure. This fear of failure is another factor that correlates with academic underachievement. Obergriesser and Stoeger (2015) affirmed fear of failure is a positive predictor of underachievement. The higher the level of fear of failure among high ability students, the more likely they are to be underachievers. Rimm (1997) believed there is an underlying issue to the fear of failure. High ability students do not function well in competition. This is not obvious in high ability students because they declare they are good students. It is their behaviors that tell

others that failing at a task makes high ability students feel like a failure. Those behaviors include task avoidance or choosing tasks they know will be easily accomplished. This notion is confirmed by Rubenstein et al. (2012) as the authors stated high ability students may believe they have the ability to perform well; however, if they do not believe their effort to the task will be successful, they will disengage or not engage at all.

McGeown et al. (2016) addressed a fear of failure when they stated the sense of control a student has over a task is crucial to the emotions experienced in relation to that task. If a task is not challenging, boredom results. If a task is too challenging, then fear or hopelessness may occur. Fear of trying and failing may be detrimental to high ability students as this may trigger a decrease in motivation. Underachievers remove themselves from failures; therefore, they do not manifest the grit to persevere with challenging tasks. High ability students may fear failure and may not function well in competition with their gifted peers. It is important for educators to promote individualized tasks that are challenging, but within realistic goals that can be achieved with student self-regulation and teacher process praise. This, consequently, could positively influence students' grit and growth mindset.

Summary of underachievement of high ability students. Underachievement is a collection of symptoms. High ability students were found more likely to react negatively after experiencing failure in comparison to general education students (Wang et al., 2012). It is important to determine what correlation exists between self-efficacy, intrinsic motivation, grit, and growth mindset to high ability students' willingness to face academic adversities.

Although it is difficult to identify factors that relate to underachievement in high ability students, research has shown that social-emotional factors correlate with underachievement. What remains unclear is the apparent cyclic nature of social-emotional factors and

underachievement. That is, does underachievement cause social-emotional issues in high ability students? Do social-emotional factors cause academic underachievement? It is important to determine the reciprocal effect that may occur. Moreover, it is imperative to understand those social-emotional factors contributing to underachievement so educators can implement instructional strategies that encourage positive non-cognitive attributes and promote high academic achievement.

Non-cognitive Attributes and Relationships to Academic Achievement

Parents send their children to school to learn and be successful. What does it mean to learn and what makes an individual unable to learn? Dweck (2006) indicated that everyone is born with a drive to learn and it begins in infancy. Children learn to talk, walk, and ride a bike and never decide these are too difficult to accomplish. They do not worry about making mistakes. When they walk or learn to ride a bike, they fall, they get back up, and try again. What could negate this passion for learning? The non-cognitive attributes that children possess may be particularly important when facing adversity while learning. Self-efficacy is a non-cognitive attribute that relates to a person's beliefs about their abilities to perform well in a variety of tasks, but especially in new or difficult tasks (Cassidy, 2015; McGeown et al., 2016). Dixson et al. (2016) noted that self-efficacy has a direct impact on student performance. Students with similar academic abilities may perform differently if they differ in self-efficacy in a particular domain. A capable student with low self-efficacy may perform poorly, whereas a less-capable student may perform well if his or her self-efficacy is high. Moreover, self-efficacy is related to effort and grit; therefore, it is correlated with academic achievement (Wang & Neihart, 2015). Furthermore, Wang and Neihart acknowledged that self-efficacy helps students regulate their academic motivation.

Students who have high self-efficacy are more likely to be intrinsically motivated in regards to effort, grit, and behavior than students who believe they are less capable of success (Mega et al., 2013). If self-efficacy is positively correlated with motivation (Wang & Neihart, 2015), then can one consider intrinsic motivation is positively correlated with academic achievement? Froiland and Worrell (2016) affirmed that intrinsic motivation has been associated with a range of constructs, including academic achievement. Moreover, students who are intrinsically motivated not only achieve more, but also are more likely to be content and emotionally healthy (Froiland & Worrell, 2016). Intrinsic motivation influences many aspects of a student's education, including academic achievement and other non-cognitive attributes.

Like intrinsic motivation, grit is a non-cognitive attribute that McGeown et al. (2016) asserted is important for overcoming adversities as children mature and face more academic challenges. Duckworth (2016) defined grit as the "passion and perseverance for long-term goals" (p. 8). Ability alone does not bring academic success. Intelligence does not always translate into academic achievement. High achievers often have the zeal and fervor to accomplish difficult tasks indicating that grit may play an essential role in academic achievement (Duckworth et al., 2007) rather than ability and intelligence solely influencing academic achievement.

As intelligence does not always translate into academic achievement, a fixed mindset may also negatively impact learning. Young children do not conceptually differentiate between effort and ability as older children and adults do (Muenks & Miele, 2017). As children grow and develop, they are able to evaluate themselves and become capable of thinking about the relationship between effort and ability (Dweck, 2006; Muenks & Miele, 2017). Children with a fixed mindset are those that believe that intelligence is established (Dweck, 2012; Esparza et al.,

2014; Ricci, 2013) and care first and foremost about how they will be judged (Dweck, 2007). They may make choices to avoid challenging tasks to ensure they succeed. Students with a growth mindset believe their intelligence is malleable and develops over time (Claro et al., 2016; Dweck, 2007, 2012, 2017; Esparza et al., 2014). Additionally, those students with a growth mindset will face academic challenges because they want to make sure they learn (Dockterman & Blackwell, 2014).

Unfortunately, many students' non-cognitive attributes put them at risk of failing to reach their full potential. However, high ability students are not normally considered at risk for underachievement. McCoach and Siegle (2003) described underachievement as a discrepancy between potential and performance, that is, a discrepancy between ability and achievement. The effect of low self-efficacy, lack of intrinsic motivation, lack of grit, and a fixed mindset may be factors that lead to underachievement in high ability students. Which non-cognitive attributes will best correlate with a high ability student highly achieving or underachieving? Literature regarding underachievement suggested that high ability underachievers have low self-efficacy (McCoach & Siegle, 2003), low motivation (Blaas, 2014), and are less gritty than their high ability peers (Duckworth et al., 2007). Other research showed that fostering a growth mindset may improve these three non-cognitive attributes (Rattan et al., 2015).

Growth mindsets positively influence academic achievement in children from elementary school to high school, particularly when facing challenging coursework (Rattan et al., 2015). Students with a growth mindset are more likely to respond to initial obstacles by remaining involved, trying new strategies, and using resources to learn (Dweck, 2010). Creating growth mindsets in the classroom may enhance other non-cognitive attributes, and as a result increase students' academic achievement. Teachers can implement strategies in the classroom, creating

an environment that fosters students' self-efficacy, intrinsic motivation, grit, and academic achievement (Dweck, 2010).

The outcome of student academic achievement is a priority in education. The achievement goal theory (Dull et al., 2015) and the implicit theory of intelligence (Blackwell et al., 2007; Dweck & Leggett, 1988) provide the foundational framework throughout this study with regard to grit and growth mindset. These two non-cognitive attributes were the primary focus as they were examined for how they correlate with academic achievement. However, due to their interplay and relationships with self-efficacy and intrinsic motivation, one cannot fully understand grit and growth mindset without having the foundational knowledge of the connections that they have with self-efficacy and intrinsic motivation.

Self-efficacy

Bandura theorized that outcomes may be determined by non-cognitive constructs, namely self-efficacy. Bandura (1977, 1986, 1995, 1997) posited that outcome expectations are based largely on an individual's self-efficacy expectations. That is, individuals anticipate outcomes based on their beliefs of how they will perform. Self-efficacy pertains to one's own belief in her ability to perform a task and is correlated with learning and academic achievement (Cassidy, 2015; Dixson et al., 2016; Pajares, 1996; Phan, 2012; Usher, 2009). Pajares (1997) acknowledged that self-efficacy differs from other non-cognitive attributes as these may determine students' capabilities to carry out a task at certain quality levels. Self-efficacy, however, may determine how much effort students will exert on an activity, how they will persevere, and how resilient they will be when faced with academic adversity (Usher, 2009).

When faced with academic adversity, high ability students typically have high self-efficacy and do not associate academic failure with a lack of ability, which helps explain how

self-efficacy has been linked to grit (Dixson et al., 2016). Self-efficacy is positively correlated with self-regulation, which is a quality high ability students tend to display (Usher, 2009; Wang & Neihart, 2015). Self-regulated learning may lead to mastery experiences. When students feel they have mastered skills or when they have accomplished challenging tasks, their self-efficacy develops (Usher, 2009). High ability students, especially those who believe their abilities are inherent, not only need self-efficacy regarding their capability to achieve, but also need to understand the importance that effort plays in improving their abilities (Rubenstein et al., 2012).

As self-efficacy can positively influence academic achievement, it may influence underachievement in high ability students as well. Previous studies have found low self-efficacy levels among high ability underachievers (Phan, 2012). Although Usher (2009) related students with high self-efficacy to the ability of facing challenging tasks, Cassidy (2015) indicated the responses of students with high self-efficacy to occurrences with academic adversity, when self-efficacy is especially important because of its connection with motivation and perseverance, are not clear. Obergriesser and Stoeger (2015) examined the effectiveness of self-regulation learning intervention that focuses on predictors of underachievement in high ability students, namely self-efficacy and goal orientation. The results showed a positive effect on learning behaviors for high ability underachievers. However, there were only slight improvements in self-efficacy. The authors noted that self-efficacy may improve over time as students experience how learning behaviors lead to increased achievement. These results coincide with Usher's study where she concluded that mastery experiences are powerful sources in the development of self-efficacy. It can be inferred that previous performance and achievement positively correlate with a student's self-efficacy.

Where other studies (Obergriesser & Stoeger, 2015; Usher, 2009) concluded self-efficacy is influenced by previous performance, Pajares (1996), on the other hand, reported that high ability students' self-efficacy is affected by their cognitive ability and previous achievement. Pajares indicated the effect of both cognitive ability and prior achievement on performance was mediated by students' self-efficacy perceptions. It is possible that high ability students may use their perceptions of their cognitive abilities as sources of efficacy information more than previous performance.

These contradictory results show that the correlation between self-efficacy and academic achievement is complex. Does self-efficacy influence academic achievement or does academic achievement influence self-efficacy? Phan (2012) contended that self-efficacy and academic achievement impact each other in a cyclic nature. Developing self-efficacy is wise given its positive influence on students' capabilities to carry out tasks in the classroom. As an example, self-efficacy in learning positively contributes to goal orientation (Phan, 2012; Usher, 2009), and this influences successful academic achievement (Phan, 2012). Further research regarding grit and growth mindset in high ability students is needed so educators may better understand how these non-cognitive attributes affect students' self-efficacy beliefs, which affect their effort, resilience, learning patterns, and thus, academic achievement.

Intrinsic Motivation

Cassidy (2015) connected self-efficacy with motivation. The topic of motivation and high abiltiy students has experienced extensive and constant attention. Motivation is defined as a set of interconnected beliefs and emotions that affect behavior (Martin & Dowson, 2009). Motivation is frequently separated into two groups: intrinsic and extrinsic. Individuals who are intrinsically motivated to learn are those who are curious, interested, seek out novelty and

challenges, and are focused on a task (Dev, 1997; Ryan & Deci, 2000), whereas those who are extrinsically motivated are more interested in the outcomes of learning than in the task itself (Clinkenbeard, 2012).

Ryan and Deci (2000; Deci & Ryan, 2008) related self-determination theory to intrinsic motivation. This theory is framed in terms of social and environmental factors that facilitate intrinsic motivation. The theory argues that social contextual events, such as feedback, enhance intrinsic motivation. Those individuals that are more intrinsically motivated tend to complete tasks and are willing to accept challenges for the sake of learning, therefore, enhancing performance and outcomes. Olszewski-Kubilius, Kulieke, and Krasney (1988) found that high ability students are more intrinsically motivated than general education students. Olszewski-Kubilius et al.'s review of studies indicated high ability students score higher on measures of motivation that suggest intrinsic reasons for learning. High ability students who are intrinsically motivated will persist with assigned tasks and will not need any reward to initiate or complete tasks, which leads to academic achievement. Gottfried (2008) noted children who are intrinsically motivated show higher achievement on standardized tests, a greater sense of academic competence, lower academic anxiety, and higher educational achievement as young adults. Intrinsic motivation positively correlates with academic achievement; however, it is perceived by some as an indirect correlation.

Intrinsic motivation associates with other attributes that relate to academic achievement, particularly with high ability students. Mega et al. (2013) considered student motivation as a "dynamic, multifaceted phenomenon" (p. 122) because it has been connected to implicit theory beliefs, such as growth mindset and self-efficacy. Students who believe they are able and will do well, are more likely to be intrinsically motivated in terms of effort and perseverance than

students who have a fixed mindset and low self-efficacy. These students are more likely to complete a task and show enthusiasm about the challenging quality of the activity (Dev, 1997; Ryan & Deci, 2000). Because high ability students are quick to understand concepts, the need for challenging curriculum is important. In classrooms where there is inadequate challenge, lack of depth, and the pace is too slow, boredom can occur and negatively affect their motivation (Phillips & Lindsay, 2006). Clinkenbeard (1994) defined intrinsically motivated students as those who are unafraid to admit they do not understand and choose suitably challenging tasks, which could indicate a willingness to take academic risks that develop learning and higher levels of academic achievement.

What role do educators play in the development of high ability students' intrinsic motivation? Developing appropriate learning activities that promote grit and growth mindset may play a role in how high ability students approach learning. The association of intrinsic motivation with these non-cognitive attributes may influence academic achievement as Renzulli (1986) connected giftedness to these non-cognitive attributes. Clinkenbeard (1996) researched the relationship between giftedness and motivation attributes, which include task commitment, causal attributions, competition, perceived competence, and self-efficacy. Similar studies by Froiland and Worrell (2016) examined how intrinsic motivation is interrelated with learning goals and academic achievement. The authors reported that students who have learning goals are more likely to enjoy learning and obtain better grades. Intrinsic motivation to learn is significantly related to student engagement. At the core of that study is the idea that having intrinsic motivation to learn leads to students deeply engaging in classroom subject matter. Therefore, if students are deeply engaged in content, then it is likely their academic performance will increase.

An indirect relationship between intrinsic motivation and academic achievement has been addressed in several studies (Clinkenbeard, 1996; Froiland & Worrell, 2016; Mega et al., 2013). Intrinsic motivation is more directly correlated with classroom engagement and other non-cognitive attributes. Students' implicit beliefs, such as growth mindset, and learning goals play an essential part in intrinsic motivation and promote and sustain academic achievement (Mega et al., 2013). These affirmations provide a foundation for obtaining further knowledge of what educators can do to cultivate classroom engagement and to nurture grit and growth mindset in high ability students so they can build or sustain intrinsic motivation, and consequently, reach their full academic potential.

Grit

As intrinsic motivation has been connected with academic achievement, grit has emerged in the world of education and has been positively correlated with academic achievement (Duckworth et al., 2007). Because grit has been identified as a non-cognitive attribute of high achievers, it is clear why it would be intriguing to educators who are anxious about raising academic achievement, and supporting children to persevere through challenges. How can grit affect students' academics? It may be helpful to understand how other non-cognitive attributes are related to grit. Grit has been connected to self-control (Duckworth & Gross, 2014), which is the ability to delay self-gratification (Stokas, 2015). Grit has also been related to hope, self-efficacy (Dixson et al., 2016), commitment (McGeown et al., 2016), resilience (Perkins-Gough, 2013), and growth mindset (Perkins-Gough, 2013; Dockterman & Blackwell, 2014). How grit correlates with these non-cognitive attributes may play an important role in high ability students' academics. For example, growth mindset is correlated with grit according to Angela Duckworth who is cited in Perkins-Gough's (2013) article when Duckworth stated "children who have more

of a growth mind-set tend to be grittier" (p. 19). Perkins-Gough also indicated that grit and resilience are related even though people use the word resilience differently. Grit is related to resilience because part of what it means to have grit is to be resilient when confronted with adversity. Having a better understanding of how grit is related to other non-cognitive attributes will help educators better serve high ability students.

McCoach and Siegle (2003) suggested what separates high ability students who achieve more from high ability underachievers are the goals they set for themselves and the effort they exert to meet those goals. Given that grit is "the passion and perseverance for long-term goals" (Duckworth et al., 2007, p. 1087), it may appear that those high ability students who are grittier will achieve more. Students who have grit set long-term goals for themselves and do not deviate from them, with or without positive feedback from their teachers (Duckworth et al., 2007). Longitudinal studies have shown that grit predicts the completion of challenging goals despite adversities along the way (Duckworth & Gross, 2014). A study (Duckworth et al., 2007) that demonstrated this concept involved students who participated in the 2005 Scripps National Spelling Bee. The hypothesis predicted those with more grit would advance to higher rounds in the spelling bee correlating to the number of hours spent preparing for the bee. Findings confirmed the hypothesis as spelling bee finalists with grit scores a standard deviation above the mean were 41% more likely to advance further in the spelling bee (Duckworth et al., 2007). This study established that gritty children who work harder and longer than those who are less gritty perform better. Extending this type of research with other student samples may provide data to formulate a more substantial conclusion for high ability students.

Perkins-Gough (2013) discussed how ability and IQ play a role in student academic achievement. Furthermore, she stated that educators may be concerned about identified high

ability students who do not know how to fail or do not know how to struggle because they do not have a great deal of practice with it. Being identified as high ability does not guarantee students will be hardworking or passionate about learning. Grit studies shed light on how grit relates to other non-cognitive attributes that are known to predict achievement (Duckworth et al., 2007). These attributes may have an effect on achievement because they are correlated to grit. As an example, the propensity to pursue long-term goals with grit may be determined by one's own intrinsic beliefs, such as self-efficacy and growth mindset.

Implications from grit studies not only confirmed grit's correlation with other non-cognitive attributes, but also indicated that as children pursue long-term goals, they should be supported by their teachers and with educational resources (McGeown et al., 2016). Yeager and Dweck (2012) addressed teacher support when students face academic challenges as they noted teachers who comforted students with process praise rather than commenting on ability put students in the mindset to persevere through the challenging task with resilience. It may be that grit predicts high academic achievement by persuading students to continuously work very hard, accept and overcome adversity, and utilize resources when pursuing long-term goals.

Some research has shown grit to have no impact on student academic achievement. Dixson et al. (2016) studied the three non-cognitive attributes of hope, self-efficacy, and grit and how those correlated to students' perceived ability and achievement. Only self-efficacy and hope were statistically significant contributors to perceived ability, while self-efficacy was the only non-cognitive attribute to positively correlate to academic achievement. These results negated those that stated grit does positively affect academic achievement. Some researchers have claimed "grit is overblown" (Dixson et al., 2016, p. 73). Crede, Tynan, and Harms (2016) refuted grit's positive impact on academic achievement. The authors concluded that there are

construct validity problems with grit scores and that grit interventions have minimal effects on academic performance. Additionally, grit adds little genetically to the prediction of academic achievement beyond personality factors (Rimfeld et al., 2016). Grit's interrelationship with other non-cognitive attributes makes it difficult to state that grit directly positively correlates with academic achievement.

A critical limitation of research studying grit has been the population samples used: undergraduate students, spelling bee finalists, and West Point cadets. More importantly, despite the evidence for grit's significant prediction of academic achievement, more attention to the effect size is necessary before considering intervention (Rimfeld et al., 2016). Rimfeld et al. conducted a twin study with regards to grit, which confirmed that grit adds little phenotypically or genetically to the prediction of academic achievement. The authors went on to state this does not mean that teaching children grit cannot be done or that it is not beneficial. A focus on grit may cultivate what high ability students need to reach their full potential and succeed in a competitive world (Golden, 2015).

Stokas (2015) believed there is a fine line that can be crossed when educators focus on grit. This *dark side* (Stokas, 2015) of grit creates a risk of educators over-attributing students' academic performance to a lack of grit without considering the crucial supports lacking in the classrooms. Students have a right to understand that their success or failure is not only correlated with their effort, but also correlated with the capability of the environment to provide necessary resources so students can experience the fruition of their effort. Follow through when completing a challenging task or studying for a test requires an ability to withstand certain amounts of discomfort (Stokas, 2015). One of the conclusions drawn from Duckworth's study involving the spelling bee participants implied that students who experienced the hardest, least

enjoyable practice were the grittiest participants and were able to advance into the final rounds of the spelling bee (Duckworth et al., 2007). Stokas questioned whether educators should send the message that suffering is part of success. Spelling bee participants are the most innocuous example of the kind of suffering that impoverished children experience in their daily lives due to the lack of support and resources. Learning to endure suffering is not what will increase academic achievement. Although more empirical studies regarding grit are needed to confirm its correlation with academic achievement, cultivating grit, providing the needed resources, and process praise in high ability education may promote the perseverance needed to succeed with a challenging curriculum.

Growth Mindset

Like grit, recent attention has been given to high ability children's implicit beliefs regarding their intelligence and their ability. One of the reasons for this attention in thinking about intelligence is due to technology that examines the function and structure of the brain. Recent brain research refuted the concept that intelligence is fixed from birth. Studies have shown that the brain can develop with the appropriate stimulus (Ricci, 2013). Other research demonstrated the concept of neuroplasticity where the human brain can grow and reorganize itself throughout a lifetime. Neuroplasticity can work in two ways; it can make new connections and can eliminate ones that are not frequently used (Dweck, 2012; Ricci, 2013).

Understanding neuroplasticity is an important concept when considering intelligence and growth mindset. Makel et al. (2015) reported high ability students considered intelligence as malleable and ability as fixed. Implicit beliefs guide expectations, provide interpretations of new information, and direct behaviors (Makel et al., 2015). Additionally, implicit beliefs relate to academics including goal setting, response to failure, and motivation (Dweck & Leggett, 1998).

In Makel et al.'s study, high ability students' implicit beliefs about ability and intelligence were examined. The authors reported a positive correlation between students' implicit beliefs about ability and intelligence, but students displayed stronger implicit beliefs about ability than they did intelligence (Makel, et al., 2015). This study suggested that many high ability students recognize ability as fixed, but believe intelligence is malleable. Perhaps if educators teach high ability students about neuroplasticity, then implicit beliefs regarding goal setting and response to failure may also change. Students who are taught that intelligence can develop, coupled with quality teacher feedback while learning, may be more willing to take educational risks in order to academically achieve.

Dweck (2012) indicated that talents and abilities are seen as dynamic and malleable. That is, they can be developed through dedication to learning. In her research, Dweck (2012) determined there are two theories that students may have about their intelligence. They can have a certain amount of intelligence or they can believe that intelligence may develop over time. Other studies have shown that students with a fixed mindset tend to avoid circumstances in which they may fail because these experiences demoralize their intelligence. On the contrary, students with a growth mindset tend to see difficult tasks as a way to strengthen their abilities and seek out challenging learning experiences (Claro et al., 2016).

Does growth mindset influence how children see difficult tasks if they are students identified as high ability? Research indicated that high ability students see their ability separately from their intelligence (Makel et al., 2015). If this is the case, then growth mindset may play a vital role in high ability students' approach to handling challenging academic tasks, effort, and thus, affect academic achievement. Dweck (2012) examined pre-medical students enrolled in a very challenging course at an Ivy League university. Students who cared more

about learning earned a better grade in the course because they had studied more intensely and were not disheartened after an inadequate grade. Conversely, students who cared more about appearing smart studied at a superficial level and had decreased motivation after a disappointing grade. This group of students did not improve after originally earning a low grade. The fixed mindset hindered this group's effort, and they avoided the situation in which they feared failure. Ricci (2013) confirmed this notion stating high achievers often blame external factors for their failures at certain tasks. The fixed mindset of high ability students directs the behaviors (Makel et al., 2015) that frequently cause those students to react with sensitivity and make excuses (Robinson & Clinkenbeard, 1998). If educators persist in telling high ability students they are smart, students will continue through school with a fixed mindset and may never show academic growth.

High ability students may be concerned with appearing smart and may go to extremes to maintain that appearance (Ricci, 2013). In some cases, high ability students may have never been required to work hard or give much effort because school had been easy for them. Nevertheless, they were praised for their good grades and being smart. A fixed mindset will lead these students to purposely avoid learning. Students who have always done well may not take chances by putting themselves in a position where others will see them fail. If they do, they may break down when they come upon a difficult task after experiencing long-time success (Dockterman & Blackwell, 2014). Failures may cause high ability students to believe they permanently lack ability. How do high ability students regain their confidence after experiencing failure? Dweck's (2012) studies found that students with a fixed mindset were not as likely as those with a growth mindset to attempt to fix their deficits when they can make themselves feel better about their abilities in other ways. For example, they may choose to study less, not take a

certain course again, or consider cheating on the next academic task to maintain their smart appearance and avoid failure. This is not a formula that promotes students' talents and abilities.

Adding to the formula, high ability students may believe if they are required to work hard and put forth effort in order to learn, then this is an indication they are no longer intelligent (Esparza et al., 2014). This display of fixed mindset, consequently, results in some high ability students attempting to hide their mistakes rather than correct them. Furthermore, students with a fixed mindset try to save their self-perceptions by withdrawing from challenges and may not have any methods to deal with challenges. High ability students with a growth mindset persevere when confronted with failure, consider challenge as an opportunity to grow, and put forth effort in order to become better and smarter (Esparza et al., 2014).

Mindset is a possible contributor to underachievement in some high ability students. One reason for this is that the school curriculum is not challenging for them. They frequently learn more quickly than others and may already have mastered much of what is being taught in their classroom (Esparza et al., 2014). Because a growth mindset may foster the growth of ability over time (Dweck, 2007), a mindset shift may benefit high ability students to reach their full potential. That is, if educators can change a student's fixed mindset to a growth mindset, then the student may achieve at higher levels when they are faced with curriculum challenges.

Shifting from a fixed mindset to a growth mindset may be difficult and it is not something that will be accomplished immediately (Ricci, 2013). However, given the negative outcomes that fixed mindsets can have on high ability students, it is important to find strategies to inspire growth mindsets. Esparza et al. (2014) noted that teaching students about the brain and study skills increased students' beliefs about the malleability of intelligence, their desire to learn, and their academic achievement. Dweck (2012) reported from a study performed on seventh

grade students where one group experienced an eight-session training on study skills and growth mindset; the other group just received study skills training. At the end of the year, the group of students who received the study skills and growth mindset training showed an increase in their grades, whereas the group who experienced just the study skills training showed declining grades.

Not only deliberately teaching growth mindset, but also giving high ability students appropriate praise may change their mindsets. Many educators have believed that praising students about their intelligence may increase confidence in their abilities, their pleasure of learning, and their abilities to excel in school (Dweck, 2007). The manner in which teachers speak to students affects how resilient they can be. Dockterman and Blackwell (2014) affirmed seemingly encouraging words of praise regarding ability can subtly undermine students' grit. Dweck (2012) reported that when students are praised for their ability they become vulnerable. They adopted a fixed mindset more so than those students praised for effort and processes used to solve problems. When high ability students were given an option to work on a task, they chose problems that were in their comfort zone. When those students came upon a challenging task and fell short, so did their achievement. On the other hand, high ability students praised for effort chose to try a task that was more difficult and their achievement improved after falling short (Dockterman & Blackwell, 2014). Conversely, the study conducted by Snyder et al. (2013) uncovered no differences in mindsets between high ability students as a result of being labeled high ability or the praises they received about their ability. Although Snyder et al. did not find a significant correlation between identified high ability students and their implicit beliefs, educators should still promote growth mindset in identified high ability students. Programming standards set by the National Association for Gifted Children (2010) encourage educators to help

gifted students formulate growth mindset and acknowledge the role that effort plays in academic achievement.

Summary of non-cognitive attributes and relationships to academic achievement. Self-efficacy's direct correlation to academic achievement remains unclear. However, self-efficacy acts as a contributing factor to behavior by influencing the effort students make and the perseverance utilized when they face academic challenges (Pajares, 1996). High self-efficacy is likely to promote better academic performance via student's non-cognitive attributes. Once educators have a better understanding of this relationship, they will be able to apply interventions aimed at enabling students to handle the demands of academic performance and achievement.

Phillips and Lindsay (2006) regarded intrinsic motivation "as the vital 'x factor' in high levels of performance and achievement" (p. 58). Studies (Clinkenbeard, 2012; Gottfried & Gottfried, 1996; Mega et al., 2013) have confirmed this notion showing a correlation between intrinsic motivation and academic achievement. Other non-cognitive attributes relate to intrinsic motivation, such as grit and growth mindset. Additionally, intrinsic motivation can be influenced by classroom engagement. It is possible that children who find classroom tasks enjoyable tend to immerse themselves in their learning. Educators can have a great impact on the development of high ability students' intrinsic motivation; therefore, the knowledge gained from research on instructional factors that influence intrinsic motivation, and other non-cognitive attributes, such as grit and growth mindset, will help develop the most effective interventions so high ability students may reach their full academic potential.

Some research has shown grit to be positively correlated with academic achievement, while others refuted that research data. Grit's connections to other non-cognitive attributes may be where positive correlation with academic achievement lies. Students who have passion and

perseverance are likely to have resilience, which is associated with self-efficacy (Cassidy, 2015). Although several studies (Duckworth et al., 2007; Duckworth & Quinn, 2009; Duckworth & Gross, 2014) have endorsed grit as a major contributor to academic achievement, other researchers disputed this noting there is little evidence for the reliability and instructional uses of grit in education. If grit does make a difference, it is still uncertain how to measure that difference and how to teach students to be gritty (Duckor, 2017).

Implicit beliefs regarding intelligence are important to a high ability student's growth mindset. Implicit beliefs correlate to results including acknowledgements to success and failure. Growth mindset in high ability students may be fostered by praising them for effort or process, which in turn, positively influences perseverance and motivation (Dweck, 2007). Cassidy (2015) confirmed growth mindset to be a major factor in the development of grit and proceeded to report that the combination of growth mindset and grit in students has been connected with higher academic achievement.

Instructional Factors Influencing High Ability Students' Non-cognitive Attributes

One of the most puzzling, and even frustrating, enigmas for those who teach high ability students is why some never reach their academic potential level. The solution to this issue may be found in the non-cognitive attributes that high ability students possess. Moreover, the instructional practices implemented in a classroom, such as quality teacher feedback, student self-regulation, and the use of goal theories have implications for positively influencing students' non-cognitive attributes.

Some educators believe that applying instructional practices that include acceleration, ability grouping, and using rich and varied curriculum materials may be all that is necessary to make a high ability student academically successful. However, Robinson and Clinkenbeard

(1998) suggested the study of high ability students with low achievement is an opportunity to investigate which instructional practices can be advocated for high ability students. Supporting learning for high ability students is an essential task for educators. How best to foster self-efficacy, intrinsic motivation, grit, and growth mindset is a critical question when teaching high ability students.

Quality teacher feedback is an instructional practice that positively correlates with non-cognitive attributes and academic achievement. To promote high ability students' views of growth mindset, for example, teachers may implement practices that use praise as a method of moving students toward a growth mindset. Giving messages of effort praise promote the love of learning, encourage taking on challenging tasks, and enhance students' skills and mastery of a task. Furthermore, the type of teacher praise given correlates with students' self-efficacy and intrinsic motivation (Lam, Yim, & Ng, 2008).

Teacher feedback is one of the most important factors that can help or hinder the development of a student's self-regulation. Student self-regulated learning is an instructional strategy that is believed to moderate the relationship between students' intrinsic motivation and academic achievement (Ariani, 2016). Students who are intrinsically motivated will demonstrate independence and will have high academic achievement. Additionally, self-regulated students are likely to use their skills, enhance their self-efficacy, and are able to increase their effort in challenging tasks (Ariani, 2016). Self-regulation is related to students' academic success in a multitude of ways and can also influence the type of goals students adopt for themselves.

Goals have been found to have strong impacts on students' academics for important reasons. First, goals can have an important role in producing achievement patterns. Second, learning environments can be created in ways that promote achievement (Grant & Dweck, 2003).

The focus of achievement may be determined by whether a student adopts mastery goal orientation or performance goal orientation. Different goals bring varied motivational patterns and results of student learning in a classroom setting. Students who adopt mastery goal orientation, or learning goals, tend to view new situations as new opportunities to learn new skills or improve upon the ones they already have. High ability students may develop performance goals, which limit their willingness to take risks when faced with challenging tasks (Siegle & McCoach, 2005). Quality teacher feedback and instructional strategies implemented in high ability education may help students realize their talents are acquired and they are capable of developing their talents further.

Quality Teacher Feedback

Students' motivation, effort, and performance may be influenced by the type of teacher feedback they receive. Widespread debate has taken place as to whether teachers should praise a student's ability or a student's effort. Much of this revolves around Dweck's (2012) incremental theory of intelligence or growth mindset. That is, students who have a growth mindset believe their intelligence can be developed over time. Even high ability students may adopt a growth mindset. Dweck (2012) emphasized that teacher praise may induce a fixed mindset when they praise a student's intelligence. This is particularly fitting for identified high ability students when they are told how intelligent they are. High ability students may begin to worry about how intelligent they look, believe they do not have to work hard or put forth effort to academically achieve or accomplish their goals, and lose their resilience when they are faced with academic adversities. This leads to the importance of how to provide feedback to high ability students.

Dweck's (2007) work alerts others to the perils established by a fixed mindset, especially the potential to change and demean achievement. How students view their own intelligence

functions as a motivating force for achievement, but a teacher's praise reinforces and influences those views. Providing feedback or praise to students can occur in two ways: intelligence praise and effort praise (Lam et al., 2008; Mueller & Dweck, 1998; Van DeWeghe, 2003). An example of intelligence praise may be, "Great job on the test! You must be smart." whereas an example of effort praise may be, "You did really well! You studied really hard and answered all of the questions." Which feedback is more effective in promoting student achievement?

Intelligence praise has been said to play an important role in students' opinions of their ability and motivation to succeed (Dweck, 2007). Mueller and Dweck (1998) reported that 85% of parents believed that praising their children's intelligence when they perform well is essential in making the children feel they are smart. This indicates the more we label children as intelligent, the more they will be motivated to achieve. Mueller and Dweck addressed the effects of intelligence praise and effort praise after students experienced a good performance. The authors stated that praise for ability may negatively affect students' responses to achievement in two ways.

First, students may adopt performance goals where successful performance becomes the primary motivational goal (Mueller & Dweck, 1998). The concentration on performance may have negative outcomes on students' perceptions and behaviors. Students who have performance goals are likely to refuse opportunities to learn if they may make mistakes and are not ensured of a satisfactory performance (Dweck, 2007; Mueller & Dweck, 1998). When students who adopt performance goals make mistakes, they will try to hide them rather than correct them. Typically, these students do not recover well from achievement setbacks (Dweck, 2007, 2012; Mueller & Dweck, 1998). Students' effort may decline. They may avoid challenging tasks. They may even resort to cheating to keep from looking unintelligent.

Second, praise for intelligence after a good performance could contribute to students' beliefs that intelligence is fixed and is determined by performance (Dweck, 2012; Mueller & Dweck, 1998). In other words, students who believe intelligence is determined by performance may think they are not smart if they do not perform well on a task. If success means they are smart, then struggling or failing means they are not smart. This could eventually lead to a loss of confidence and enjoyment of learning.

If intelligence praise brings undesirable outcomes for students' achievement after failure, then what type of feedback or praise will promote perseverance, resilience, or grit when students experience failures? Effort praise is said to affect students in terms of both their goals and their attributions (Dweck, 2017; Haimovitz & Dweck, 2017; Mueller & Dweck, 1998). Effort praise encourages students to attribute their learning to effort and the process of their work (Lam et al., 2008; Mueller & Dweck, 1998). Instead of performance goals, students who receive effort praise tend to turn toward learning goals (Dweck, 2017), which have been associated with high achievement and motivation (Clinkenbeard, 2012; Mueller & Dweck, 1998). Unlike intelligence praise, students who receive effort praise from their teachers often display perseverance, enjoyment, and high-quality performance when faced with academic adversities. Additionally, effort praise may lead students to associate good performance or achievement with effort (Dweck, 2017; Haimovitz & Dweck, 2017; Mueller & Dweck, 1998). If a student does not perform well on a task, then he may see the poor performance as a lapse in effort, rather than intelligence.

Some researchers have previously compared intelligence and effort praise and reported contradictory statements from Mueller and Dweck's (1998) work. Schunk (1996), for example, found that intelligence praise at times had a more beneficial effect on students' achievement

motivation, particularly self-efficacy, than effort praise did. For instance, if a student was told he was very good at math, then that student improved his math achievement more than a student who had been given effort praise. Because this research only pertained to conditions of student successes, Mueller and Dweck set out to determine if teacher feedback made a difference in a variety of conditions. Considering all six studies conducted (Mueller & Dweck, 1998), the collective findings provided striking evidence of how intelligence praise and effort praise affect students' beliefs and achievement. Summarizing the results, the authors reported the intelligence praise seemed to teach students to value performance, whereas effort praise seemed to direct students to value learning opportunities. Furthermore, students who received intelligence praise measure their intelligence from their performance, as opposed to those students who received effort praise. Children who were praised for intelligence had tendencies to lie to others about their scores to avoid looking unintelligent. Mueller and Dweck concluded that intelligence praise was found to turn children to a fixed mindset, where those students who were given effort praise turned to more of a growth mindset. More recently, Dweck (2017) reaffirmed praising intelligence creates fixed mindsets and a helpless reaction to adversity whereas praising the process, such as hard work or good strategies, as a reason for their high-quality performance fosters growth mindsets. These findings may have implications for labeling students as high ability, which could be a form of intelligence praise. Students who are given that label may become so concerned with justifying their status as high ability that they may not be concerned with accepting challenges that will improve their skills.

What if high ability students learn about the relationship between effort and ability? Would this make a difference? Lam et al. (2008) believed students need to establish their beliefs about the relationship between effort and ability because those beliefs will determine the effects

of effort praise. Despite the evidence that correlates effort praise with positive learning outcomes, perseverance, increased motivation, and better reactions to academic setbacks, Lam et al. contradicted those findings by hypothesizing students who were praised for their effort showed less skill acquisition and self-efficacy than students who were given intelligence praise.

In light of inconsistent findings, one may ask if effort praise is effective or not. Knowing the answer to this question will help teachers determine what feedback or praise to provide to students. Students may have different beliefs on the relationship between effort and ability. One belief is the inverse rule, that is, the less ability a student has, the more effort that must be exerted to be successful. Conversely, students may side with the positive rule, that is, the more effort that is exerted, the higher that student's ability (Lam et al., 2008). Barker and Graham (1987) found a developmental trend in how students view the relationship between ability and effort. Young students typically view effort and ability as a positive relationship, whereas older students view effort and ability as negatively related. Could the cognitive maturity of older students play a role in this view? High ability students typically have a higher level of cognitive maturity (Robinson & Clinkenbeard, 1998). If this is the case, then one may suppose that high ability students believe that effort and ability have an inverse relationship.

Lam et al.'s (2008) findings did not confirm if effort praise or intelligence praise is better. What it did suggest was effort praise could be de-motivational when students believe in the inverse relationship between effort and ability. It also found that if a student believes in a positive relationship between effort and ability, then effort praise is positively correlated to motivation. Summarizing these findings, the type of praise a student best responds to depends on the student's cognitions about effort and ability. If a student believes in the positive rule, he will respond better to effort praise and his motivation may increase. Perhaps students should be

taught about the relationship between effort and ability before teachers administer effort praise. Other instructional strategies also play a role in increasing student motivation, effort, and academic achievement.

Student Self-regulation

Teacher feedback may be an influencing role in the development of self-regulated learners. Self-regulation has been defined as a process where students learn to control their behaviors, cognition, and motivation (Ariani, 2016; Chung & Yuen, 2011; Day & Connor, 2017; Mega et al., 2013; Ocak & Yamac, 2013). Self-regulated students are those who understand task requirements and the necessary strategies to successfully persevere and perform. They plan, organize, monitor, and evaluate their learning (Day & Connor, 2017; Mega et al., 2013; Ocak & Yamac, 2013). Developing autonomous high ability students could be an effective strategy to help them reach their full academic potential.

Providing constructive feedback on students' efforts, teaching students effective strategies for beginning learning tasks, encouraging self-monitoring, and creating a climate where students can take responsibility for their own learning are methods that can be used by teachers to promote student self-regulation (Chung & Yuen, 2011). A positive correlation of effort praise or feedback with self-regulation has been established. Effort praise is said to increase a student's intrinsic motivation (Mueller & Dweck, 1998). What relationship does self-regulation have with intrinsic motivation and do those interrelate to influence academic achievement?

Despite Rubenstein et al.'s (2012) hypothesis that teaching high ability students self-regulation skills promotes academic achievement, their results indicated the most effective strategy is to make learning more relevant. High ability students already have the skills to be

successful, but they opt not to use them because their learning tasks are not relevant. However, most studies have shown that self-regulation is connected to academic achievement. Ariani (2016) believed high self-regulation positively influences motivation and self-efficacy. This interrelationship connects to academic achievement. In other words, self-regulation is significantly correlated to students' self-efficacy and students' academic performance. It seems as though self-regulation has many facets that affect academic achievement. Self-regulation is related to motivational beliefs (Ocak & Yamac, 2013), self-efficacy, and effort, all of which have been connected to academic achievement (Ariani, 2017; Mega et al., 2014). Day and Connor (2017) confirmed this when they associated self-regulation with student success in math and reading. Although self-regulation may not be directly connected to academic achievement, it is apparent when learning is meaningful and relevant that intrinsic motivation, effort, and student self-regulation interrelate to foster academic achievement.

Due to the many facets of self-regulation, reciprocal relationships between self-regulation and other non-cognitive attributes have been established. Usher (2009) acknowledged the reciprocity between self-regulation and self-efficacy. Students with high self-efficacy plan, organize, and monitor their academic progress more effectively than those students with low self-efficacy. Similarly, when students increase their self-regulation skills, their self-efficacy improves. Ariani (2017) confirmed a reciprocal relationship between self-regulation and motivation. Students' motivation is an important component of self-regulation. However, self-regulation can improve students' motivation.

The interplay of self-regulation and intrinsic motivation affects students' academic achievement. Students with high intrinsic motivation will have the self-regulatory skills to academically achieve. Another attribute to consider is effort. Students with self-regulatory skills

are better able to regulate their effort. Ariani (2017) commented that self-regulation is an effortful process that encourages academic achievement. These relationships may be deemed as key factors when considering high ability achievement. High ability students typically are intrinsically motivated and self-efficacious. If teachers of high ability students provide relevant and meaningful opportunities and effort praise throughout self-regulated learning, high ability students may increase their opportunity of reaching their full academic potential.

Goal Orientation

Setting goals may influence students' academic achievement and help them reach their full potential. Two goals that have extensive research with regard to their effects on academic achievement are performance goals and learning goals. Performance goals, often called ability goals or ego-involved goals, validate a student's ability or avoid demonstrating a lack of ability. Learning goals, also called mastery goals, on the other hand, are those where a student seeks to obtain new knowledge (Grant & Dweck, 2003; King et al., 2017). Both of these goals have been associated with motivation and academic achievement.

Performance goals focus on measures of ability. Students who are praised for their intelligence may adopt performance goals as successful performance becomes their primary goal (Mueller & Dweck, 1998). In contrast, Dweck (2017) concluded praising students for their process led to more growth mindset and mastery-oriented goals. In other words, telling students they are smart when they perform may cause them to continue proving they are smart by receiving high grades. However, if students do not perform well or they experience a setback in their achievement, then they may experience feelings of helplessness and lower levels of intrinsic motivation. Learning goals, conversely, focus on development of skills. Students who are praised for their effort or process maintain their focus even when faced with academic adversities

(Dweck, 2017; Haimovitz & Dweck, 2017; Mueller & Dweck, 1998). The type of goal a student sets, whether it is a learning goal or performance goal, relates to how he learns and if he is willing to take risks when faced with challenging academic tasks.

Grant and Dweck (2003) noted inconsistencies with respect of how performance goals and learning goals affect motivation when students were faced with challenging tasks. Usually, those who orient to learning goals are found to engage more deeply in self-regulated learning, have higher levels of intrinsic motivation, and perform better when faced with challenging tasks (Dweck, 2012, 2017). However, Grant and Dweck noted studies have failed to confirm increased academic performance as a result of learning goals.

Previous studies conducted by Mueller and Dweck (1998) showed 67% of students who received intelligence praise chose performance goals, whereas 92% of students who received effort praise chose learning goals. That is, effort praise led students to want to learn more, thus increasing their intrinsic motivation. Grant and Dweck's (2003) study indicated that learning goals were negatively related to decreases in intrinsic motivation and performance goals were positively related to decreases in intrinsic motivation. Additional results from the same study showed associations of low ability to be related to decreases in intrinsic motivation and helplessness. On the other hand, associations of effort were related to maintaining intrinsic motivation and coping skills. When students were placed in a scenario where they faced an academic challenge, those that adopted learning goals showed active, engaged responding. Those students in the same scenario who adopted performance goals withdrew from engagement. Furthermore, King et al.'s study (2017) confirmed that mastery, or learning goals, are positively associated with motivational engagement, sense of purpose, self-reliance, affect to school, and

positive self-concept, which supports the findings in Mueller and Dweck's and Grant and Dweck's studies.

Summarizing Grant and Dweck's (2003) results, learning goals were associated with positive coping skills when students faced challenging academic tasks. Learning goals appear to be a significant predictor of behaviors that will maintain intrinsic motivation and academic achievement. Students who choose learning goals should be able to see setbacks or failures as ways to improve their learning, rather than as a sign of low ability. Furthermore, performance goals that are focused on validating a student's ability level can have positive effects on academic performance when students succeed with challenging tasks. However, those same performance goals may reduce intrinsic motivation and academic performance if students experience setbacks in their learning.

Chessor (2014) examined high ability students who were grouped in two different settings. One was a mixed ability setting and the other was a homogenous group of high ability students. The purpose of the study was to consider the effects of placement on goal orientation of high ability students. All students were administered the School Motivation Questionnaire (Marsh & Craven, 1994). The results, contrary to Grant and Dweck's (2003) study, indicated learning goals decreased significantly over time for both groups and the magnitude of these decreases was similar for both groups as well. One may conclude from this study that high ability students in a homogeneous setting may orient to performance goals to preserve their self-worth, which Robinson and Clinkenbeard (1998) affirmed is a characteristic of identified high ability children.

The type of goals that high ability students set influences their motivation to learn. McCoach and Siegle (2003) reported a significant correlation between students' goals and their

motivation to achieve those goals. Their research affirmed that high ability underachievers and high ability achievers substantially differed on the issue of motivation. The goals that high ability students set for themselves frequently mirror the effort they put forth to achieve those goals.

Summary of instructional factors influencing high ability students' non-cognitive attributes. Many factors contribute to high ability students' capability of reaching their full academic potential. High ability students who are underachieving may be receiving instructional strategies that do not promote non-cognitive attributes or the study skills for them to be academically successful. Quality teacher feedback, particularly effort praise, has been consistently found to increase a student's intrinsic motivation, self-efficacy, and growth mindset. All of these non-cognitive attributes have been shown to have a positive correlation with academic achievement.

High ability students should be encouraged to develop independence and creativity, which are both a part of self-regulated learning. Self-regulation has been confirmed to be a predictor of academic achievement and has also been connected with intrinsic motivation and self-efficacy. The interconnection between self-regulation and non-cognitive attributes may help educators better understand why some high ability students may turn to task avoidance behaviors when faced with academic challenges. Research findings from Mega et al. (2014) affirmed that students' growth mindset, self-efficacy, and their goal orientation play an important role in their motivation. All of these constructs are closely-linked to self-regulatory learning that promotes and sustains academic achievement.

The type of goals a high ability student sets has a connection to academic achievement. Grant and Dweck's (2003) study confirmed learning goals positively impact a student's intrinsic

motivation and academic performance when a student faces academic challenges. Performance goals, on the other hand, have positive impacts on academic performance when a student has had success, but not when faced with challenges. Educators who can provide a nurturing and supportive classroom environment with quality teacher feedback will promote the resilience in high ability students needed to tackle academic challenges. The goals high ability students adopt, whether learning or performance oriented, affect motivation and achievement. This appears to be related to how goal orientation correlates to other non-cognitive attributes.

Summary

This review of literature has elucidated the multiple ways in which non-cognitive attributes, quality teacher feedback, student self-regulation, and goal orientation relate to high ability students' academic achievement. Research supports the proposition that non-cognitive attributes impact students' capacity to academically perform. Furthermore, the interplay of self-efficacy, intrinsic motivation, grit, and growth mindset relates to students' academic behaviors. That is, students who display one or more of the aforementioned non-cognitive attributes are more likely to take on challenging tasks within a classroom. On the other hand, if students do not have self-efficacy, intrinsic motivation, grit, or growth mindset, they are more likely to academically underachieve.

In order to promote positive non-cognitive attributes, educators are encouraged to be mindful of the type of feedback they provide to their students. Mueller and Dweck (1998) reported process praise, rather than intelligence praise, promotes growth mindset, self-efficacy, and intrinsic motivation, all of which have a significant correlation with academic achievement. Additionally, educators' instructional methods or support in the classroom influences high ability students' learning. Because some high ability students are perfectionists and often set unrealistic

and unattainable goals that lead to failure (Fletcher & Speirs Neumeister, 2012; Wang et al., 2012), educators need to support high ability students by facilitating goal setting so they set reasonable goals that are achievable yet challenging, thus deterring task avoidance behaviors and underachievement. Educators should also encourage high ability students to develop autonomy and creativity, which provide the framework for self-regulated learning (Day & Connor, 2017; Mega et al., 2013; Ocak & Yamac, 2013).

Much research has been completed on the relationship of non-cognitive attributes and academic achievement in general education. However, one cannot assume that high ability students will acquire positive non-cognitive attributes or respond to teacher feedback and instructional practices in the same manner as general education students. Therefore, more empirical support is needed for the proposition that non-cognitive attributes and teacher feedback impact high ability students' capacity to academically perform. Chapter Three will describe the research methods used to provide the empirical evidence needed for implications of educational practice with regard to high ability students.

CHAPTER THREE

RESEARCH METHODS

High ability students sometimes show a discrepancy between ability and achievement. Underachieving high ability students show a wide range in their behaviors, interests, and abilities (Reis & McCoach, 2000). The behaviors may be influenced by their non-cognitive attributes of growth mindset, grit, self-efficacy, and intrinsic motivation. In this study, the focus was on two of these non-cognitive attributes: growth mindset and grit. The rationale for selecting these two was that growth mindset was confirmed to be an important factor in the development of grit, and the combination of growth mindset and grit in students has been associated with higher academic achievement (Cassidy, 2015). Additionally, using two constructs allowed the researcher to include more questions per construct while reducing the risk of survey fatigue in students by keeping the total number of survey questions at a minimum. In what ways do non-cognitive attributes correlate with high ability students' academic achievement? Moreover, how do educators foster these non-cognitive attributes in their classrooms to promote academic achievement and growth in high ability students? Fostering student self-regulation, promoting goal setting, and using quality process feedback may help promote non-cognitive attributes and higher achievement in high ability students.

This chapter will describe the research methods. Areas to be discussed include research design, population and sample, sampling procedures, instrumentation, data collection procedures, data analysis, and limitations. The research design will begin with an online survey and will use quantitative methods. The population and sample section will discuss the individuals chosen for this study and why they were chosen. The sampling procedures will include the criteria used in

the sample selection. The next section will describe the instrumentation, which will be an electronic survey using Qualtrics. Relevant information including validity and reliability, how the survey will be administered and scored, and response categories will also be included. Following instrumentation, a section devoted to the data collection procedures will describe the appropriate steps taken to conduct the study to ensure accuracy. The data analysis section will provide an explanation of how data will be analyzed, including the rationale for the selection of the analysis process. Finally, the limitations will be described and the chapter will conclude with a summary and preview of Chapter Four and Chapter Five.

Purpose of the Study

The purpose of this study was to determine what non-cognitive attributes correlate with academic achievement of identified high ability students in fourth through eighth grades while controlling for the intervening variables of teacher feedback, student self-regulation, and goal orientation. The independent variables were the non-cognitive attributes of grit and growth mindset. The dependent variables were the measurements from student and teacher responses obtained from a five-point Likert scale survey and the students' Northwest Evaluation Association (NWEA) achievement scores.

Research Questions

Given the purpose of this study was to quantify which non-cognitive attributes correlate with high ability students' academic achievement, the research had a central question with sub-questions that guided my investigation of data collection. The central, or overarching question, guiding this study was:

1. What amount of variance do growth mindset and grit have on high ability students' academic achievement as measured by NWEA scores?

The following sub-questions guided research and data analysis for this study:

2. What amount of variance do growth mindset and grit have on high ability students' academic achievement while controlling for teacher process feedback?

3. What amount of variance do growth mindset and grit have on high ability students' academic achievement while controlling for time spent teaching student self-regulation?

4. What amount of variance do growth mindset and grit have on high ability students' academic achievement while controlling for time spent with students on their individual goal setting?

Research Design

A quantitative research approach was chosen for this study. According to Creswell (2014), "quantitative research is an approach for testing objective theories by examining the relationship among variables" (p. 4). It allows researchers to analyze numbered data using statistical procedures. Creswell also added that quantitative research is best if a problem calls for the "identification of factors that influence outcomes…or understanding the best predictors of outcomes" (p. 20). Although many non-cognitive attributes may influence high ability students' academic achievement, growth mindset and grit were of particular interest for the study based on their significance emphasized by literature. In this cross-sectional study, growth mindset and grit were analyzed to determine if they correlate with academic achievement in high ability students as measured by NWEA RIT scores. The survey responses and NWEA scores were collected at one time. Based on Dweck, Chiu, and Hong's study (1995b), the implicit theory of intelligence scale that measures growth mindset displayed good internal consistency (α = .82 to .97) and test-retest reliabilities at two weeks (α = .80 to .82). Duckworth and Quinn (2009) found evidence

that the Grit-S scale is relatively stable over time. Correlation between scores on the Grit-S from one year to the next was $r = .68$, $p < .001$. The Grit-S scale showed good internal consistency at two assessments administered from one year to the next, $\alpha s = .82$ in the first year and $\alpha s = .84$ in the second year. Because these two scales showed the reliability and internal consistency, correlating survey results within a reasonable time frame to students' NWEA achievement scores was feasible for this particular study. This study also considered teacher process feedback, student self-regulation, and goal orientation as intervening variables because these may have moderated the effects that growth mindset and grit had on high ability students' academic achievement. That is, the intervening variables may have affected the direction or strength of the relation between the independent variables and the dependent variable (Baron & Kenny, 1986).

A survey was used to determine what non-cognitive attributes correlate with high ability students' academic achievement. According to Fowler (2014), research surveys have two defining premises. The first is those that respond to the survey target the population. The other premise is that the answers people give can be used to accurately describe the characteristics of the respondents. Additionally, surveys have disadvantages and advantages. Some disadvantages, particularly with Internet surveys, include not having the interviewer involved with the data collection, varied response rates, a need for comprehensive address lists, and the challenges of enlisting cooperation (Fowler, 2014). Offsetting these disadvantages, benefits include minimal cost of data collection, potential for quick returns, and respondents do not have to share answers with an interviewer, potentially making the collection of sensitive data to be more valid (Fowler, 2014). Reinforcing Fowler's statements, Creswell (2014) affirmed that utilizing a survey provides a numeric explanation of attitudes or opinions from a sample. Considering the purpose of this study, I conducted a survey of identified high ability students and

their teachers, enabling their perceptions to be quantified. I used an online survey approach primarily because it was a more accessible method of data collection than mail, telephone, or face-to-face surveys (Couper & Miller, 2008). Because of the accessibility, an online survey accelerated the process of data collection.

Population and Sample

This study examined responses from a population in Indiana of identified high ability students in grades 4 through 8 who take the NWEA achievement test and their teachers. Students in this population were selected because they were able to read and comprehend the survey questions, as the majority of fourth graders have passed the Indiana Reading Evaluation and Determination (IREAD-3) assessment demonstrating a foundational understanding of literacy. Because this study examined the influences of teacher feedback, time spent teaching student self-regulation, and time spent with students on their individual goal setting have on high ability students' non-cognitive attributes and academic achievement, the high ability students' teachers were also surveyed.

Sampling Procedures

According to the Indiana Department of Education (2017), there are 293 public school corporations. It was the hope that this research study would encompass a variety of school corporations in Indiana; no specific corporations were targeted in this study. A sample size of 200 students and their teachers would provide sufficient power within the inferential tests that were selected and discussed later in this chapter.

The data sources were students and teachers who participate in Indiana public school corporations' high ability programs and utilize NWEA achievement testing. In order to access those data sources, an email was sent to district high ability coordinators seeking permission to

survey identified high ability students in grades 4 through 8 and teachers who teach high ability students (Appendix A). After receiving permission, a letter was sent to high ability teachers (Appendix B) via email asking for their participation in administering the electronic survey to their students and complete the teacher survey as well. Once teachers completed their consent forms (Appendix C), an informal letter to the high ability students' parents (Appendix D) to bolster student participation and elicit their support of their child's survey completion was disseminated and collected along with the parent consent forms (Appendix E) and student consent forms (Appendix F), a link to the electronic survey was sent via email. The teacher was given a list of student codes and what needed to be typed on each survey. For example, a student may have had a code of T1S3 (Teacher 1, Student 3). The researcher had a master list that indicated T1S3 was equal to a student identification number, which was electronically linked. These student numbers were randomized to protect students' anonymity.

Instrumentation

The development of a survey instrument was necessary to obtain the perceptual data required to address the non-cognitive attributes of growth mindset, grit, self-efficacy, and intrinsic motivation. The survey was originally composed with four non-cognitive attributes, but due to feedback from members of the dissertation committee, it was reduced to measuring only growth mindset and grit (Appendix G). Using two constructs allowed the researcher to include more questions per construct without the risk of survey fatigue in students by keeping the total number of survey questions to 16. Additionally, if all four constructs were surveyed, it would have only allowed five questions per construct; issues could have arisen with internal consistency when only using five items from 8-item surveys, like those used with growth mindset and grit. A second survey administered to teachers of identified high ability students

was necessary to obtain their perceptions of how feedback, time spent teaching student self-regulation, and time spent with students on their individual goal setting relate to high ability students' academic achievement (Appendix H). The two surveys enabled the researcher to analyze how the students' perceptions of grit and growth mindset, while controlling for teacher feedback, time spent teaching student self-regulation, and time spent with students on their individual goal setting, correlate with high ability students' academic achievement.

The surveying instrument used in this research study was Qualtrics. This was subject to acceptable protocols and the permission from the Institutional Review Board. Questions for each survey were in the format of a Likert scale rating system ranging from a score of one designating the lowest magnitude of response to a score of five signifying the highest magnitude. The ratings for the student surveying instrument were 1-*strongly disagree*, 2-*disagree*, 3-*neither disagree nor agree*, 4-*agree*, 5-*strongly agree*. Using a multiple-item scale provided increased reliability and precision (Spector, 1992). Single items may have elicited "yes" answers one day, but "no" answers the next; thus, single items are particularly unreliable. Single item responses are imprecise because they limit measurement to only two levels. In other words, test respondents can only be placed into two groups with no method of distinguishing among people in each group. Furthermore, using an odd-numbered Likert scale provided responders a neutral response option. Croasmun and Ostrom (2011) stated that responders "are not required to decide one way or the other on an issue; this may reduce the chance of response bias… Respondents do not feel forced to have an opinion if they do not have one" (p. 20). Moreover, Garland (1991) observed that the lack of a mid-point category yielded more negative ratings than when one was included.

Spector (1992) contended that using multiple questions increases the scope. Measured characteristics may be broad in scope and not easily assessed with a single question due to complexity. Additionally, demographics were considered and included the students' grade level, gender, and ethnicity. After the demographic questions, the student survey consisted of two sections. The first section consisted of eight questions pertaining to growth mindset. The next section of the survey had eight questions concerning grit. Overall, there were 16 questions on the student survey instrument, which yielded statistical information regarding two non-cognitive attributes and how those correlate with students' academic achievement.

The teacher survey had three sections with five questions in each and one demographic section that addressed the grade taught, subject taught, years of teaching experience, school setting, and gender. The first set of survey questions was dedicated to the area of teacher feedback. The next two sections pertained to instructional strategies with particular attention to student self-regulation and goal setting. Because the researcher was concerned with the frequency of the teacher feedback and instructional practices, the Likert-type response anchors had the ratings of 1-*never*, 2-*rarely*, 3-*sometimes*, 4-*often*, *5-almost always*. A total of 15 questions yielded statistical information showing which teacher practices may correlate with high ability students' academic achievement. To ensure that data collection from students and teachers in the same corporation could be analyzed, the surveys were coded as mentioned previously. Not only did the coding allow the relationship between teacher feedback, time spent teaching student self-regulation, and time spent with students on their individual goal setting and student academic achievement, to be considered, it also maintained the anonymity of survey respondents.

The items on the student survey instrument were used with permissions from Dweck and the Duckworth Team (Appendix I). The student survey instrument contained eight items from Dweck's (2000) Theories of Intelligence questionnaire and the Short Grit Scale (Grit-S), which also had eight items (Duckworth & Quinn, 2009). Duckworth and Quinn recommended the 8-item Grit-S because it is shorter and is psychometrically stronger than the 12-item Grit-O. Furthermore, the fewer number of items does not hinder the predictive validity. Given the Grit-S has comparable predictive validity to Grit-O and has fewer items, it was the better fit survey for students in grades 4 through 8. Because the teacher survey instrument was self-developed, it was important to establish validity and reliability. To ensure validity of the teacher survey, a group of experts reviewed the survey prior to beginning the study. This process assisted with establishing the survey's principles and ensuring the questions were written in a manner that elicited the concepts the researcher set out to measure. Copies of the teacher survey were given to the following experts for their critique of the validity of each item of the teacher survey: Dr. Marilynn Quick, Ball State University Assistant Professor and dissertation chairperson; Dr. Kendra Lowery, Ball State University Assistant Professor, EdS/EdD Program Director; Dr. Nick Elam, Assistant Professor of Educational Leadership; Dr. Kristi Speirs Neumeister, Professor of Psychology Educational Psychology; and Dr. Kianre Eouanzoui, Ball State University Statistician, Research and Academic Effectiveness. Steps taken to ensure reliability included conducting a pilot test with 43 high ability teachers who did not participate in the research study. They provided feedback regarding access, navigation within the survey, coding issues, and general observations. Revisions to the survey were made based on the feedback provided from the pilot test. Reliability was analyzed using a Cronbach's alpha for each non-cognitive attribute, teacher feedback, and instructional practices to form a composite value. If the

Cronbach's alpha was 0.70 or higher, then survey results were considered reliable demonstrating greater internal consistency (Spector, 1992). If Cronbach's alpha was less than 0.70, the survey instrument would have been edited by removing weak questions to improve the overall domain alpha to the desired score for reliability.

Data Collection Procedures

Data collection was accomplished utilizing the electronic survey instrument Qualtrics. The survey was sent to all school corporations where the high ability coordinator's permission to disseminate the survey was granted. The survey was disseminated to each participating school corporation's high ability teachers and they issued the survey link to students. This step, along with the coding, protected the anonymity of the participants. The survey was open for a three-week period once approval was obtained from the Institutional Review Board. A reminder email was sent at the beginning of weeks two and three of the survey window. If the minimum survey response rate was not satisfied, the window for survey submission would have been extended for a fourth week with another email reminder to those participating public school corporations. Copies of the permission-seeking letter to the high ability coordinators, the informed consent letter to participants, and student and teacher surveys are located in Appendices A-H of this study. Once all surveys were completed, the data were exported from Qualtrics to IBM SPSS Version 23 for analysis.

Data Analysis

The data from each respondent for the independent variables of growth mindset and grit, and the intervening variables of teacher feedback, student self-regulation, and goal orientation were calculated from the questions from each section and a combined mean score that was established for that section based on the previously described five-point Likert scale. In cases

where participants did not answer all of the questions within the survey, steps were taken to ensure that at least 90% of all questions were answered. If a submitted survey was below 90% completion, that survey was removed from the sample.

Inferential statistical analysis for this study was performed through the application of a simultaneous multiple and a hierarchical regression. A regression analysis is a technique for describing the relationship between the dependent variable and one or more independent variables (Stolzenberg, 2004). The use of simultaneous multiple regression to predict the relationship between variables is possible through a computational equation, which provides a mathematical explanation of a relationship and the contributions of predictor variables in terms of explained variance (Gravetter & Wallnau, 2013). Hierarchical multiple regression is a useful approach when there are covariates (Field, 2009). For example, in this study, the researcher was interested in ascertaining if the non-cognitive attributes correlated with academic achievement after taking into account teacher feedback, time spent teaching student self-regulation, and time spent with students on their individual goal setting. Because teacher feedback and instructional practices were intervening variables, that is, they moderated the effects that growth mindset and grit have on high ability students' academic achievement; they were entered first to remove the amount of variance the intervening variables were explaining. The non-cognitive attributes were then analyzed for the significant amount of variance within the remaining variance. The independent variables in multiple regression analysis are referred to as predictor variables. The dependent variable, on the other hand, is referred to as the criterion variable (Aiken & West, 1991). Each of the regression analyses in this study had predictor variables indicating the two non-cognitive attributes of grit and growth mindset. The predictor variables were used to explain the significant amount of variance among identified high ability students' academic achievement

scores. That is, this study sought to find the linear combination of predictors that correlated to the dependent or criterion variable (Field, 2009), which were the measurements obtained from the students' NWEA achievement scores. The assumptions for regression testing were analyzed to ensure the validity of the findings. Additionally, if significance within the model was found, the coefficients output would have been interpreted to build a prediction equation and determine the rank order of the predictor success in explaining variance within the criterion variable. In the event the sample size was insufficient to conduct simultaneous and hierarchical multiple regression analyses, a correlation analysis would be performed to address questions that were concerned with the relationship between high ability students' non-cognitive attributes and academic achievement. Because correlation measures the degree of linear association between two quantitative variables (Coladarci & Cobb, 2014), a correlation analysis was feasible with a smaller sample size.

Limitations/Delimitations

Factors can bias a research study or reduce the scope of it that are beyond the researcher's control. The limitations are important to highlight so the extent to which they affect the study may be determined. The self-report of teachers' responses was likely to be different from what may have been observed in their classrooms. Therefore, respondent willingness to participate with honesty in a sincerely apparent and reflective manner was beyond the researcher's control. The curriculum and instruction that high ability students experience varies among high ability programs. The researcher did not have control of what curriculum and instructional strategies that may have influenced the students' NWEA achievement scores. A school district's definition and identification process of high ability students differs across Indiana. In other words, high ability is a relative definition across the state in which a student may be identified as high ability

in one school district but not another. The researcher did not have control of how students have been identified as high ability. Students, particularly, may have experienced survey fatigue and not completed some of the survey questions. Additionally, the researcher could not control if and how much parents may talk to their children about grit and growth mindset, which may have impacted students' perceptions of these non-cognitive attributes. Finally, this study could not control for all influences a teacher has on a group of students within their high ability classroom as only teacher feedback, student self-regulation, and goal orientation were being explored.

Factors that the researcher may impose on the study can restrict the scope. In this particular study, the researcher limited the participants to teachers and their students in grades 4 through 8 that have been identified as high ability in Indiana and utilized NWEA testing. High ability students who did not take the NWEA achievement test were not included in this study. The focus of the survey included two non-cognitive attributes (growth mindset and grit), teacher feedback, student self-regulation, and goal orientation and did not encompass all factors that can potentially influence student academic achievement. The researcher was not measuring the growth of the non-cognitive attributes moderated by the intervening variables of teacher feedback, student self-regulation, and goal orientation. Otherwise, baseline data of grit and growth mindset values would have been collected.

Summary

The information in this chapter presented a description of the research methodology and the procedures that were used to conduct research for this study. A description of the data sources and how those were selected were discussed. Furthermore, the type of instrumentation and how data were collected were considered, including how validity and reliability were determined. Other information included descriptions of simultaneous multiple and hierarchical

regressions that were used to analyze the collected data. This allowed for studying the shared variance and potential predictability of the variables. Lastly, the parameters of the study were defined in terms of limitations and delimitations. Chapter Four will discuss the results or findings on the data collected and analyzed, while Chapter Five will summarize the findings and discuss implications for practice and recommendations for further research.

CHAPTER FOUR

RESULTS

As previously discussed, this study investigated the correlation of the non-cognitive attributes of growth mindset and grit with high ability students' academic achievement. Chapter Four begins with a reminder of the purpose of the study and the research questions. It will be followed by a summary of data from the teacher pilot survey, description of the demographic data of the students and teachers from the participating school districts along with the descriptive statistics regarding the areas of growth mindset and grit. The subsequent sections of this chapter are arranged by the research questions that guided this study and will address the inferential statistical analysis regarding each research question. Chapter Four will conclude with a summary section highlighting the key findings within the chapter.

Purpose of the Study

The purpose of this study was to determine what non-cognitive attributes correlate with academic achievement of identified high ability students in fourth through eighth grades while controlling for the intervening variables of teacher feedback, student self-regulation, and goal orientation. The independent variables were the non-cognitive attributes of grit and growth mindset. The dependent variables were the measurements from student and teacher responses obtained from a five-point Likert scale survey and the students' Northwest Evaluation Association (NWEA) achievement scores.

Research Questions

The central, or overarching, question guiding this study was:

1. What amount of variance do growth mindset and grit have on high ability students' academic achievement as measured by NWEA scores?

The following sub-questions guided research and data analysis for this study:

2. What amount of variance do growth mindset and grit have on high ability students' academic achievement while controlling for teacher process feedback?

3. What amount of variance do growth mindset and grit have on high ability students' academic achievement while controlling for time spent teaching student self-regulation?

4. What amount of variance do growth mindset and grit have on high ability students' academic achievement while controlling for time spent with students on their individual goal setting?

Results of Teacher Pilot Survey

Before disseminating the surveys to the participants of this study, a pilot survey was performed with a group of 43 teachers within a school district that did not participate in this study. These teachers took the survey via Qualtrics and the data were exported into SPSS to establish reliability using a Cronbach's alpha. As noted in Chapter Three, Cronbach's alpha of 0.70 or higher would be considered reliable as it would demonstrate greater internal consistency (Spector, 1992). Each teacher subscale produced a Cronbach's alpha greater than 0.70 with the results presented in Table 1. The overall survey reliability also exceeded the required 0.70. Reliability and internal consistencies were established. The survey was then disseminated to participating teachers.

Table 1

Teacher Pilot Survey Reliability Statistics

Teacher Construct Scale	Cronbach's alpha
Teacher Feedback Subscale	0.75
Self-Regulation Subscale	0.86
Goal Orientation Subscale	0.91
Entire Survey Scale	0.90

Descriptive Statistics

Identified high ability students in grades 4 through 8 in four different Indiana school districts participated in this research study. In total, 180 students completed the online survey. Fifteen different teachers also provided information by completing their own surveys with questions that focused on teacher feedback, student self-regulation, and goal orientation. The response rate for the student survey was 97.8% and the response rate for the teacher survey was 100%. This section provides a description of the demographic data of the high ability students and teachers included in this study. Demographic data were collected from each student participant in the areas of gender, grade level, and ethnicity. The teacher demographics included the grade level taught, subject(s) taught, years of teaching experience, school setting, and gender.

Each student who participated in this study took the NWEA MAP Growth achievement test within a given period to maintain the internal consistencies and reliability of the growth mindset and grit survey results (Duckworth & Quinn, 2009; Dweck et al., 1995). Because NWEA RIT scores tend to increase as grade level increases, a RIT composite score was calculated by taking the norm grade level mean RIT score and subtracting it from the student's

RIT score. This provided a more accurate overall RIT composite score to represent a student's academic achievement at each grade level.

Description of the Participants

Identified high ability students in grades 4 through 8 participated in this study. Of the 180 student participants, 76 (42.2%) were males and 104 (57.8%) were females. Elementary students included 25 fourth graders (13.9%) and 24 (13.3%) students were in fifth grade. Middle or junior high school student participants included sixth through eighth grades, which included 47 (26.21%) sixth graders, 53 (29.4%) seventh graders, and 31 (17.2%) eighth graders. The predominant ethnicity represented within in the student participant group was White as 134 (74.4%) White students participated. Other ethnic groups were represented: Black, 2 (1.1%); Hispanic, 15 (8.3%); Multiracial, 16 (8.9%); Asian/Pacific Islander, 10 (5.6%); American Indian, 2 (1.1%); and Native Hawaiian/Other Pacific Islander, 1 (0.6%). The whole sample's NWEA reading overall RIT composite scores ranged from -12.2 to 48.0 with M = 19.14 (SD = 8.84), meaning one student scored 12.2 points below the norm mean RIT score, while another student scored 48 points above the norm mean. The NWEA math overall RIT composite scores ranged from -12.6 to 47.1 with M = 20.55 (SD = 10.86).

The 15 teachers who completed surveys indicated what subject area(s) they teach. Some teachers taught both Reading/Language Arts and Math, while others only taught one subject area. It is more typical for a teacher to specialize in one subject area in the middle and junior high schools. Thirteen (86.7%) teachers indicated they teach Reading/Language Arts while two (13.3%) said they did not teach Reading/Language Arts. Three (20.0%) stated they teach Math and 12 (80.0%) teachers indicated they do not teach Math. One teacher of the 15 (6.7%) who participated indicated he teaches both Reading/Language Arts and Math.

Another demographic specified on the teacher survey was years of teaching experience. Table 2 displays the number of teachers' responses for each of the categories for teaching experience. Teachers were very equally spread for the categories including three or more years.

Table 2

Teacher Experience Frequencies

Years of Experience Categories	Strongly Disagree
0-2	1 (6.7%)
3-5	3 (20.0%)
6-10	5 (33.3%)
11-15	3 (20.0%)
16-19	0 (0%)
20+	3 (20.0%)

Teachers also indicated their school setting as rural, suburban, or urban. The number of those teaching in a rural setting was six (40.0%), seven (46.7%) in a suburban setting, and two (13.3%) in an urban setting. Lastly, teachers identified their gender. Of the 15 teachers who participated in the study, four (26.7%) were males and 11 (73.3%) were females.

Description of growth mindset from the whole sample. All student participants responded to the same eight statements regarding growth mindset using a five-point Likert scale with ratings of 1-*strongly disagree*, 2-*disagree*, 3-*neither disagree nor agree*, 4-*agree*, and 5-*strongly agree*. Table 3 displays the frequency data of the growth mindset responses for each Likert scale from students in the whole sample.

Table 3

Whole Sample Students' Growth Mindset Response Frequencies

Growth Mindset Construct Statements	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
1	67 (37.2%)	78 (43.3%)	24 (13.3%)	9 (5.0%)	2 (1.1%)
2	61 (33.9%)	84 (46.7%)	16 (8.9%)	17 (9.4%)	2 (1.1%)
3	4 (2.2%)	11 (6.1%)	12 (6.7%)	84 (46.7%)	69 (38.3%)
4	68 (37.8%)	86 (47.8%)	12 (6.7%)	11 (6.1%)	2 (1.1%)
5	2 (1.1%)	9 (5.0%)	35 (19.4%)	89 (49.4%)	45 (25.0%)
6	29 (16.1%)	88 (48.9%)	31 (17.2%)	28 (15.6%)	4 (2.2%)
7	1 (.6%)	11 (6.1%)	13 (7.2%)	107 (59.4%)	48 (26.7%)
8	1 (.6%)	10 (5.6%)	26 (14.4%)	100 (55.6%)	43 (23.9%)

Note. Growth mindset construct statements may be found in Appendix G with the above corresponding numbers.

The whole sample responses provided evidence that most of the identified high ability students who participated in this study tended to demonstrate a growth mindset. The growth mindset composite score ranged from 2.0 to 5.0 with a mean score of 4.04 (*SD* = .64). These results showed the majority of these high ability students believe their intelligence can change. In other sections of this chapter, the whole sample data will be compared to each participating grade level, gender, and school setting to determine if growth mindset tendencies vary among these groups.

Description of grit from the whole sample. The second portion of the student survey consisted of eight statements pertaining to grit. The statements were formatted in the same manner as the growth mindset statements using a five-point Likert scale. Table 4 presents the frequency data of the grit responses for each Likert scale from students in the whole sample.

Table 4

Whole Sample Students' Growth Mindset Response Frequencies

Grit Construct Statements	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
9	7 (3.9%)	40 (22.2%)	34 (18.9%)	82 (45.6%)	17 (9.4%)
10	6 (3.3%)	35 (19.4%)	49 (27.2%)	65 (36.1%)	25 (13.9%)
11	5 (2.8%)	41 (22.8%)	32 (17.8%)	77 (42.8%)	25 (13.9%)
12	0 (0%)	1 (.6%)	17 (9.4%)	97 (53.9%)	63 (35.0%)
13	8 (4.4%)	42 (23.3%)	61 (33.9%)	62 (34.4%)	7 (3.9%)
14	18 (10.0%)	66 (36.7%)	35 (19.4%)	42 (23.3%)	19 (10.6%)
15	3 (1.7%)	27 (15.0%)	64 (35.6%)	57 (31.7%)	29 (16.1%)
16	2 (1.1%)	3 (1.7%)	46 (25.6%)	93 (51.7%)	36 (20.0%)

Note. Grit construct statements may be found in Appendix G with the above corresponding numbers.

The grit composite score for the whole sample ranged from 1.86 to 5.0 with a mean score of 3.31 (*SD* = .64). These results were suggestive of an overall average perception of grit as evident in the mean score. In following sections of this chapter, the whole sample data will be compared to each participating grade level, gender, and school setting to determine if grit perceptions vary among these groups.

Description of growth mindset and grit from fourth grade sample. Twenty-five identified high ability fourth graders participated in the study. Table 5 represents the frequencies of the growth mindset responses for each Likert scale from students in fourth grade. The majority of the fourth graders' answers provided evidence suggesting they believe their intelligence can change.

Table 5

Fourth Grade Students' Growth Mindset Response Frequencies

Growth Mindset Construct Statements	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
1	16 (64.0%)	7 (28.0%)	2 (8.0%)	0 (0%)	0 (0%)
2	10 (40.0%)	11 (44.0%)	1 (4.0%)	2 (8.0%)	1 (4.0%)
3	1 (4.0%)	0 (0%)	0 (0%)	11 (44.0%)	13 (52.0%)
4	12 (48.0%)	12 (48.0%)	1 (4.0%)	0 (0%)	0 (0%)
5	1 (4.0%)	0 (0%)	0 (0%)	11 (44.0%)	13 (52.0%)
6	12 (48.0%)	8 (32.0%)	4 (16.0%)	1 (4.0%)	0 (0%)
7	0 (0%)	1 (4.0%)	0 (0%)	13 (52.0%)	11 (44.0%)
8	0 (0%)	0 (%)	0 (0%)	14 (56.0%)	11 (44.0%)

Note. Growth mindset construct statements may be found in Appendix G with the above corresponding numbers.

When comparing the fourth grade data to the whole sample, the data distribution was quite similar. Both groups appeared to have had the highest frequency of strongly agree for statements three, five, seven, and eight. All of these statements were regarding level of intelligence and being able to change it; students strongly agreed that they are able to change their level of intelligence. Consequently, the strongly disagree frequencies for fourth graders seem to compare to the whole sample's with statements one, two, four, and six having the highest frequencies. These statements were related to having a fixed mindset. Fourth grade students, much like the whole sample, believe they can change their intelligence.

The fourth grade frequencies indicated those students had an opinion of growth mindset. That is, their frequencies of neither disagree nor agree were very low. The whole sample's frequencies of neither disagree nor agree appeared to be higher with the highest being 35 (19.4%) for statement five while fourth graders' frequency was 0%. The mean growth mindset composite score for the whole sample was 4.04 (*SD* = .64) while the mean for fourth graders was

4.41 (*SD* = .48). The fourth graders' data seemed less dispersed from the mean than the whole sample.

The remaining eight statements of the survey pertained to grit. Table 6 displays the frequencies of the grit responses from the fourth grade participants. The frequencies in Table 6 supported that fourth grade students generally believe they are hard workers and are diligent; however, they can become distracted or lose interest in a project.

Table 6

Fourth Grade Students' Grit Response Frequencies

Grit Construct Statements	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
9	1 (4.0%)	6 (24.0%)	4 (16.0%)	12 (48.0%)	2 (8.0%)
10	1 (4.0%)	7 (28.0%)	3 (12.0%)	8 (32.0%)	6 (24.0%)
11	0 (0%)	0 (0%)	2 (8.0%)	16 (64.0%)	7 (28.0%)
12	0 (0%)	0 (0%)	0 (0%)	13 (52.0%)	12 (48.0%)
13	0 (0%)	4 (16.0%)	5 (20.0%)	14 (56.0%)	2 (8.0%)
14	1 (4.0%)	11 (44.0%)	4 (16.0%)	6 (24.0%)	3 (12.0%)
15	1 (4.0%)	4 (16.0%)	14 (56.0%)	6 (24.0%)	0 (0%)
16	2 (8.0%)	2 (8.0%)	2 (8.0%)	17 (68.0%)	2 (8.0%)

Note. Grit construct statements may be found in Appendix G with the above corresponding numbers.

All of fourth graders, as did the majority of the whole sample, indicated they are hard workers. The frequencies also compared with regard to statement 10 pertaining to setbacks not discouraging students. Most students agreed; however, there was a similar distribution of frequencies for strongly agree and disagree when fourth graders were compared to the whole sample.

More differences seem to have existed between fourth graders' perceptions of grit than those of the whole sample. For example, when it comes to finishing what students begin, no fourth graders indicated they strongly agreed and only six (24.0%) agreed. The whole sample's frequency appeared much higher with 57 (31.7%) agree responses and 29 (16.1%) strongly agree

responses. The grit composite score for fourth graders ranged from 2.0 to 4.14 with *M* = 3.07 (*SD* = .46). The mean was slightly less than the whole sample (*M* = 3.31) and the data points were closer to the mean than the whole sample (*SD* = .64). The NWEA reading overall RIT fourth grade composite scores ranged from 11.0 to 36.0 with *M* = 23.64 (*SD* = 7.06). The NWEA math overall RIT composite scores ranged from 8.0 to 45.0 with *M* = 25.96 (*SD* = 11.24). It appears the means for both NWEA math and reading overall RIT composite scores were higher for fourth graders than for the whole sample; however, I cannot claim these scores were statistically higher without inferential statistics. This group of high ability students perhaps scored higher than their norm grade level mean.

Description of growth mindset and grit from fifth grade sample. Twenty-four identified high ability fifth graders completed the online survey. Table 7 depicts the frequencies of the growth mindset responses for each Likert scale from fifth grade students. The fifth graders' answers suggested evidence they also believe their intelligence can change and show tendencies of growth mindset.

Table 7

Fifth Grade Students' Growth Mindset Response Frequencies

Growth Mindset Construct Statements	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
1	5 (20.8%)	16 (66.7%)	3 (12.5%)	0 (0%)	0 (0%)
2	11 (45.8%)	9 (37.5%)	3 (12.5%)	1 (4.2%)	0 (0%)
3	0 (0%)	0 (0%)	0 (0%)	13 (54.2)	11 (45.8%)
4	13 (54.2%)	9 (37.5%)	1 (4.2%)	1 (4.2%)	0 (0%)
5	0 (0%)	0 (0%)	2 (8.3%)	17 (70.8%)	5 (20.8%)
6	2 (8.3%)	18 (75.0%)	3 (12.5%)	1 (4.2%)	0 (0%)
7	0 (0%)	0 (0%)	0 (0%)	16 (66.7%)	8 (33.3%)
8	0 (0%)	0 (0%)	3 (12.5%)	15 (62.5%)	6 (25.0%)

Note. Growth mindset construct statements may be found in Appendix G with the above corresponding numbers.

Like the fourth graders, the fifth grade students' growth mindset data seemed comparable to the whole sample. The statements pertaining to growth mindset where students indicated intelligence can change elicited similar distributions of the frequencies for agree and strongly agree responses. Fifth grade students actually had a stronger opinion of no matter who they are, they can significantly change their intelligence, where 100% answered agree or strongly agree. The whole sample for that statement was 85.0%. Fifth graders also selected responses similar to the whole sample for those statements regarding fixed mindset as they selected disagree or strongly disagree.

Some differences occurred between the growth mindset data of the fifth grade students and the whole sample. The range of the growth mindset composite scores was 3.75 to 5.00 for fifth graders whereas the range was larger for the whole sample, 2.00 to 5.00. It appears the mean composite score of 4.28 (*SD* = .31) was slightly higher than the whole sample (*M* = 4.04, *SD* = .64). The data possibly were more closely packed around the mean for fifth graders.

Table 8 provides the data for the fifth grade students' responses to the grit portion of the survey. The grit response data generally presented fifth graders as hard workers and as diligent. However, the grit response data also showed fifth graders as sometimes having difficulty completing projects as was evident in statements 11 and 14.

Table 8

Fifth Grade Students' Grit Response Frequencies

Grit Construct Statements	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
9	1 (4.2%)	4 (16.7%)	8 (33.3%)	11 (45.8%)	0 (0%)
10	0 (0%)	5 (20.8%)	10 (41.7%)	7 (41.7%)	2 (8.3%)
11	0 (0%)	6 (25.0%)	9 (37.5%)	6 (25.0%)	3 (12.5%)
12	0 (0%)	0 (0%)	3 (12.5%)	12 (50.0%)	9 (37.5%)
13	0 (0%)	7 (29.2%)	10 (41.7%)	7 (29.2%)	0 (0%)
14	1 (4.2%)	7 (29.2%)	9 (37.5%)	4 (16.7%)	3 (12.5%)
15	0 (0%)	5 (20.8%)	12 (50.0%)	5 (20.8%)	2 (8.3%)
16	0 (0%)	0 (0%)	4 (16.7%)	16 (66.7%)	4 (16.7%)

Note. Grit construct statements may be found in Appendix G with the above corresponding numbers.

When comparing the fifth grade responses to the whole sample, both groups considered themselves hardworking and diligent. While the whole sample had 88.9% of students agree and strongly agree with being hardworking, 87.5% of fifth graders indicated the same. However, no fifth graders disagreed or strongly disagreed.

Fifth graders showed a tendency to be distracted from finishing projects as indicated in the data presented for statements nine, 11, and 14. More students in the whole sample disagreed or strongly disagreed with those statements. When comparing the fifth graders' grit descriptive statistics with the whole sample, the ranges of the composite scores differed. The fifth grade range was 2.43 to 4.43, while the whole sample was 1.86 to 5.00. The means were comparable where $M = 3.33$ ($SD = .58$) for fifth graders and $M = 3.31$ ($SD = .64$) for the whole sample. Fifth grade student grit response data were more dispersed than the data for growth mindset. Fifth graders that participated in this study did not have NWEA math RIT scores because they took the survey with their Language Arts teacher; however, their reading overall RIT composite scores ranged from 3.0 to 34.0 as $M = 18.96$ ($SD = 7.37$). The highest overall RIT composite score and the mean score were less than the whole group and fourth grade samples.

Description of growth mindset and grit from sixth grade sample. Forty-seven sixth graders participated in the study. Table 9 provides the results for sixth grade growth mindset response frequencies. The range of growth mindset composite scores was 2.25 to 5.00 with M = 4.05 (SD = .68). This may indicate this group of participants had more of a growth mindset than a fixed mindset.

Table 9

Sixth Grade Students' Growth Mindset Response Frequencies

Growth Mindset Construct Statements	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
1	22 (46.8%)	15 (31.9%)	5 (10.6%)	4 (8.5%)	1 (2.1%)
2	21 (44.7%)	22 (46.8%)	2 (4.3%)	2 (4.3%)	0 (0%)
3	2 (4.3%)	3 (6.4%)	3 (6.4%)	19 (40.4%)	20 (42.6%)
4	20 (42.6%)	20 (42.6%)	4 (8.5%)	3 (6.4%)	0 (0%)
5	1 (2.1%)	0 (0%)	16 (34.0%)	19 (40.4%)	11 (23.4%)
6	7 (14.9%)	22 (46.8%)	11 (23.4%)	7 (14.9%)	0 (0%)
7	1 (2.1%)	2 (4.3%)	5 (10.6%)	29 (61.7%)	10 (21.3%)
8	1 (2.1%)	3 (6.4%)	8 (17.0%)	21 (44.7%)	14 (29.8%)

Note. Growth mindset construct statements may be found in Appendix G with the above corresponding numbers.

Like fourth and fifth graders, this group of sixth grade students' answers supported a growth mindset. Their answers indicated they believe intelligence can change. This, subsequently, related to the whole sample data as indicated in the growth mindset composite scores when compared to the whole sample where M = 4.04 (SD = .64).

Although the data were comparable to the whole sample, statement eight responses presented marginally different information. Four (8.5%) sixth graders disagreed and strongly disagreed with "You can change even your basic intelligence level considerably" while that statement elicited 11 (6.2%) selected disagree and strongly disagree responses in the whole sample. More students in the sixth grade strongly agreed with that statement, representing

29.8%, which was 5.9% higher than the whole sample. It appears as though the groups slightly differ on their perceptions of this statement, but overall, presented a growth mindset.

Table 10 displays the response frequencies on the grit portion of the survey from sixth grade students. The range of grit composite scores was 2.00 to 4.83 with $M = 3.42$ ($SD = .69$). With the mean value of 3.42, this indicated that the sixth grade students surveyed primarily neither disagreed nor agreed, perhaps demonstrating a mixed perception of grit.

Table 10

Sixth Grade Students' Grit Response Frequencies

Grit Construct Statements	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
9	1 (2.1%)	16 (34.0%)	7 (14.9%)	20 (42.6%)	3 (6.4%)
10	2 (4.3%)	8 (17.0%)	14 (29.8%)	15 (31.9%)	8 (17.0%)
11	1 (2.1%)	14 (29.8%)	8 (17.0%)	21 (44.7%)	3 (6.4%)
12[a]	0 (0%)	0 (0%)	2 (4.3%)	30 (63.8%)	14 (29.8%)
13	2 (4.3%)	11 (23.4%)	20 (42.6%)	14 (29.8%)	0 (0%)
14	7 (14.9%)	18 (38.3%)	9 (19.1%)	10 (21.3%)	3 (6.4%)
15	0 (0%)	7 (14.9%)	16 (34.0%)	16 (34.0%)	8 (17.0%)
16	0 (0%)	0 (0%)	18 (38.4%)	20 (42.6%)	9 (19.1%)

Note. Grit construct statements may be found in Appendix G with the above corresponding numbers.
[a]One student did not respond to this statement.

The mean of grit composite scores was highly comparable to that of the whole sample where $M = 3.31$ ($SD = .64$). Additionally, the frequencies of responses were similar. Most students indicated they are hard workers. Other comparable responses included agreeing to being distracted from projects when presented with a new one, losing interest in a project, and maintaining a focus on a project if it lasts more than a few months. These types of responses tend to indicate a lack of grit.

On the contrary, the overall scores for sixth graders and the whole sample were contrasting. Sixth grade reading overall RIT composite scores had a higher mean of 21.37 ($SD =$

10.67), which was a difference of 2.23 RIT points from the whole sample. The math overall RIT composite scores presented a different representation. For sixth grade, the range was -4.60 to 27.40 while $M = 9.82$ ($SD = 9.08$), which was 10.73 RIT mean points below the math overall RIT composite scores with the range of -12.6 to 47.10 from the whole sample.

Description of growth mindset and grit from seventh grade sample. Table 11 displays the 53 high ability seventh grade students' response frequencies. The data presented the pattern of having a perception of growth mindset with seventh graders. This was evident by the strongly disagree and disagree responses for statements one, two, four, and six that addressed fixed mindset. Data from statements three, five, six, and seven represented a strong opinion of growth mindset.

Table 11

Seventh Grade Students' Growth Mindset Response Frequencies

Growth Mindset Construct Statements	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
1	17 (32.1%)	22 (41.5%)	10 (18.9%)	3 (5.7%)	1 (1.9%)
2	11 (20.8%)	24 (45.3%)	10 (18.9%)	7 (13.2%)	1 (1.9%)
3	1 (1.9%)	3 (5.7%)	6 (11.3%)	24 (45.3%)	19 (35.8%)
4[a]	19 (35.8%)	23 (43.4%)	5 (9.4%)	4 (7.5%)	1 (1.9%)
5	0 (0%)	4 (7.5%)	15 (28.3%)	23 (43.4%)	11 (20.8%)
6	4 (7.5%)	28 (52.8%)	7 (13.2%)	12 (22.6%)	2 (3.8%)
7	0 (0%)	4 (7.5%)	5 (9.4%)	29 (54.7%)	15 (28.3%)
8	0 (0%)	2 (3.8%)	12 (22.6%)	33 (62.3%)	6 (11.3%)

Note. Growth mindset construct statements may be found in Appendix G with the above corresponding numbers.
[a]One student did not respond to this statement.

Seventh grade high ability students' data compared with the other grade levels presented thus far and with the whole group sample. That is, the response frequencies that indicate the perception of growth mindset occurred among all of the groups presented. For example, statement three, "No matter who you are, you can significantly change your intelligence level,"

produced above an 80% frequency of strongly agree and agree from all groups presented thus far with seventh grade producing 81.1% frequency.

Conversely, seventh grade high ability students' data appeared to differ from the whole sample when comparing NWEA overall RIT composite scores. In each area of reading and math, the NWEA RIT composite scores were lower than the whole sample with *M* = 15.19 (*SD* =7.56) for reading and *M* = 17.42 (*SD* = 8.98) for math for the seventh grade group. In other words, the high ability seventh grade students did not have a RIT composite as high on the NWEA reading and math achievement tests as the whole sample.

Table 12 shows the grit response frequencies for the seventh grade students. The frequency distribution was quite similar to the whole group sample. High ability seventh graders' grit composite scores ranged from 1.86 to 5.0 with *M* = 3.34 (*SD* = .67), which were data almost identical to the whole sample.

Table 12

Seventh Grade Students' Grit Response Frequencies

Grit Construct Statements	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
9	3 (5.7%)	10 (18.9%)	9 (17.0%)	23 (43.4%)	8 (15.1%)
10	3 (5.7%)	8 (15.1%)	9 (17.0%)	26 (49.1%)	7 (13.2%)
11	2 (3.8%)	11 (20.8%)	12 (22.6%)	20 (37.7%)	8 (15.1%)
12[a]	0 (0%)	0 (0%)	6 (11.3%)	28 (52.8%)	18 (34.0%)
13	4 (7.5%)	10 (18.9%)	16 (30.2%)	19 (35.8%)	4 (7.5%)
14	7 (13.2%)	16 (30.2%)	9 (17.0%)	16 (30.2%)	5 (9.4%)
15	2 (3.8%)	6 (11.3%)	13 (24.5%)	19 (35.8%)	13 (24.5%)
16	0 (0%)	0 (0%)	14 (26.4%)	26 (49.1%)	13 (24.5%)

Note. Grit construct statements may be found in Appendix G with the above corresponding numbers.
[a]One student did not respond to this statement.

The responses showed the tendency for seventh grade high ability students to have an average perception of grit as most of the higher percentages occurred with the response of

neither disagree nor agree. Although responses of agree and strongly agree occurred at a relatively high frequency for the whole sample and seventh graders on survey statement 10, "Setbacks do not discourage me," the seventh graders' frequency of 62.3% was higher than the whole sample at 50.0%. Both groups, however, indicated a tendency of grit for that statement.

Statement 14 was the only one where there appeared to be a difference in the strength of perception from the whole group sample. The statement, "I have difficulty maintaining focus on projects that take more than a few months to complete," produced responses in the whole group with a frequency of 46.7% strongly disagree and disagree. For seventh graders, the response frequency was 43.4% strongly disagree and disagree. Seventh graders had a 3.3% lower response frequency of strongly disagree and disagree about maintaining focus on projects.

Description of growth mindset and grit from eighth grade sample. Table 13 represents the growth mindset response frequencies for the final grade level of high ability students that participated in this study. The total number of eighth grade high ability students who completed the survey was 31. The distribution of responses was a bit more varied than other grade levels and the whole sample.

Table 13

Eighth Grade Students' Growth Mindset Response Frequencies

Growth Mindset Construct Statements	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
1	7 (22.6%)	18 (58.1%)	4 (12.9%)	2 (6.5%)	0 (0%)
2	8 (25.8%)	18 (58.1%)	0 (0%)	5 (16.1%)	0 (0%)
3	0 (0%)	5 (16.1%)	3 (9.7%)	17 (54.8%)	6 (19.4%)
4	4 (12.9%)	22 (71.0%)	1 (3.2%)	3 (9.7%)	1 (3.2%)
5	0 (0%)	5 (16.1%)	2 (6.5%)	19 (61.3%)	5 (16.1%)
6	4 (12.9%)	12 (38.7%)	6 (19.4%)	7 (22.6%)	2 (6.5%)
7	0 (0%)	4 (12.9%)	3 (9.7%)	20 (64.5%)	4 (12.9%)
8	0 (0%)	5 (16.1%)	3 (9.7%)	17 (54.8%)	6 (19.4%)

Note. Growth mindset construct statements may be found in Appendix G with the above corresponding numbers.

When comparing the NWEA math overall RIT composite scores, the high ability eighth grade students' range was 10.10 to 47.10 with the lower end being the highest of all grade levels represented. The mean was 25.01 (*SD* = 9.19), which was also the highest mean of the groups and was 4.46 higher than the whole sample. The eighth grade high ability students' reading overall RIT mean composite score, *M* = 19.01 (*SD* = 7.63), was .13 lower than the whole sample.

The growth mindset composite range was 2.00 to 4.88 with *M* = 3.78 (*SD* = .72). The mean of this eighth grade group was .26 lower than the mean of the whole sample. A possible explanation for this is that this group of high ability students did not indicate strongly agree as often as the whole sample, which will lower the growth mindset composite score mean.

Table 14 displays the grit response frequencies from the eighth grade high ability students. Table 14 shows that the eighth grade high ability participants selected neither disagree nor agree more often than the whole sample. These students did not have as strong of a tendency toward having grit as the whole sample.

Table 14

Eighth Grade Students' Grit Response Frequencies

Grit Construct Statements	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
9	1 (3.2%)	4 (12.9%)	6 (19.4%)	16 (51.6%)	4 (12.9%)
10	0 (0%)	7 (22.6%)	13 (41.9%)	9 (29.0%)	2 (6.5%)
11	2 (6.5%)	10 (32.3%)	1 (3.2%)	14 (45.2%)	4 (12.9%)
12	0 (0%)	1 (3.2%)	6 (19.4%)	14 (45.2%)	10 (32.3%)
13	2 (6.5%)	10 (32.3%)	10 (32.3%)	8 (25.8%)	1 (3.2%)
14	2 (6.5%)	14 (45.2%)	4 (12.9%)	6 (19.4%)	5 (16.1%)
15	0 (0%)	5 (16.1%)	9 (29.0%)	11 (35.5%)	6 (19.4%)
16	0 (0%)	1 (3.2%)	8 (25.8%)	14 (45.2%)	8 (25.8%)

Note. Grit construct statements may be found in Appendix G with the above corresponding numbers.

Statements 10, 12, and 14 prompted eighth grade students to select neither disagree nor agree more than the whole sample. Most of the students indicated they are hard workers, much like the other student groups; however, 19.4% could not disagree or agree with that statement. That frequency was 10.0% greater than the whole sample. On the other hand, it appears Questions 11 and 14 prompted eighth grade students to indicate neither disagree nor agree less often than the whole sample by 14.6% and 7.0% respectively. These data potentially explain why the grit composite score range was 2.25 to 4.63 with $M = 3.23$ ($SD = .69$). The mean grit composite score for eighth grade high ability students was .08 lower than the whole sample.

Description of growth mindset and grit from male gender sample. Another group of participants to present is gender. Seventy-six identified high ability males in grades 4 through 8 participated in this study. Table 15 displays the male students' growth mindset response frequencies.

Table 15

Male Students' Growth Mindset Response Frequencies

Growth Mindset Construct Statements	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
1	36 (47.4%)	25 (32.9%)	11 (14.5%)	4 (5.3%)	0 (0%)
2	31 (40.8%)	35 (46.1%)	4 (5.3%)	4 (5.3%)	2 (2.6%)
3	2 (2.6%)	4 (5.3%)	3 (3.9%)	38 (50.0%)	29 (38.2%)
4	32 (42.1%)	35 (46.1%)	4 (5.3%)	4 (5.3%)	1 (1.3%)
5	0 (0%)	2 (2.6%)	13 (17.1%)	40 (52.6%)	21 (27.6%)
6	13 (17.1%)	43 (56.6%)	11 (14.5%)	9 (11.8%)	0 (0%)
7	1 (1.3%)	4 (5.3%)	4 (5.3%)	42 (5.3%)	25 (32.9%)
8	1 (1.3%)	4 (5.3%)	7 (9.2%)	44 (57.9%)	20 (26.3%)

Note. Growth mindset construct statements may be found in Appendix G with the above corresponding numbers.

Males had a tendency toward a growth mindset as suggested by their responses. For example, statements one, two, four, and six that pertained to a fixed mindset, the males in this study strongly disagreed or disagreed with not being able to change their intelligence. Additionally, they strongly agreed or agreed with the statements regarding a growth mindset. It appears the male group's growth mindset data coincided with the whole group. These were confirmed by the growth mindset composite score range being identical from 2.00 to 5.00. The whole sample was $M = 4.04$ ($SD = .64$), while the male was $M = 4.14$ ($SD = .61$), which were comparable results.

Table 16 presents the male students' grit response frequencies. The response frequencies were comparable to other groups; however, the high ability males selected neither disagree nor agree more often than the whole sample. Otherwise, the male sample related to the others presented thus far.

Table 16

Male Students' Grit Response Frequencies

Grit Construct Statements	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
9	4 (5.3%)	15 (19.7%)	13 (17.1%)	36 (47.4%)	8 (10.5%)
10	4 (5.3%)	10 (13.2%)	19 (25.0%)	30 (39.5%)	13 (17.1%)
11	2 (2.6%)	17 (22.4%)	12 (15.8%)	34 (44.7%)	11 (14.5%)
12[a]	0 (0%)	0 (0%)	7 (9.2%)	51 (67.1%)	17 (22.4%)
13	2 (2.6%)	13 (17.1%)	27 (35.5%)	31 (40.8%)	3 (3.9%)
14	9 (11.8%)	27 (35.5%)	13 (17.1%)	18 (23.7%)	9 (11.8%)
15	0 (0%)	12 (15.8%)	33 (43.4%)	24 (31.6%)	7 (9.2%)
16	1 (1.3%)	1 (1.3%)	21 (27.6%)	42 (55.3%)	11 (14.5%)

Note. Grit construct statements may be found in Appendix G with the above corresponding numbers.
[a]One student did not respond to this statement.

When comparing the male student group to the whole sample, statement 10, "Setbacks do not discourage me", prompted different degrees of answers between the two groups. In the male student group, 56.6% selected agree and strongly agree while 50.0% of the whole sample chose agree and strongly agree. The whole sample frequencies for that particular question were 6.6% lower than the frequencies of the male student group.

When comparing the NWEA math overall RIT composite scores, the high ability male students' range was 2.40 to 47.10. The mean was 23.80 (*SD* = 10.31), 3.25 higher than the whole sample. The high ability male students' reading overall RIT mean composite score, *M* = 19.62 (*SD* = 10.18), appeared to be .48 higher than the whole sample.

Description of growth mindset and grit from female gender sample. A total of 104 female high ability students completed the survey regarding growth mindset and grit. Table 17 shows their response frequencies to the growth mindset portion of the survey. The majority of the female students' answers provided evidence they believe their intelligence can change.

Table 17

Female Students' Growth Mindset Response Frequencies

Growth Mindset Construct Statements	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
1	31 (29.8)	53 (51.0%)	13 (12.5%)	5 (4.8%)	2 (1.9%)
2	30 (28.8%)	49 (47.1%)	12 (11.5%)	13 (12.5%)	0 (0%)
3	2 (1.9%)	7 (6.7%)	9 (8.7%)	46 (44.2%)	40 (38.5%)
4[a]	36 (34.6%)	51 (49.0%)	8 (7.7%)	7 (6.7%)	1 (1.0%)
5	2 (1.9%)	7 (6.7%)	22 (21.2%)	49 (47.1%)	24 (23.1%)
6	16 (15.4%)	45 (43.3%)	20 (19.2%)	19 (18.3%)	4 (3.8%)
7	0 (0%)	7 (6.7%)	9 (8.7%)	65 (62.5%)	23 (22.1%)
8	0 (0%)	6 (5.8%)	19 (18.3%)	56 (53.8%)	23 (22.1%)

Note. Growth mindset construct statements may be found in Appendix G with the above corresponding numbers.
[a]One student did not respond to this statement.

When comparing the female student data to the whole sample, the data distribution was comparable. Both groups had the highest frequency of strongly agree for statements three, five, seven, and eight. All of these statements were regarding level of intelligence and being able to change it; students strongly agreed that they are able to change their level of intelligence. Subsequently, the strongly disagree frequencies for female students also paralleled the whole sample's on the statements regarding fixed mindset as they had the highest frequencies. Female students, much like the whole sample, disagreed with not being able to change their intelligence.

While the female student data were comparable to the whole sample, two data points were potentially noticeable. Female students agreed to, "Your intelligence is something about you that you cannot change very much," 12.5% of the time, while the whole sample agreed 9.4%, which was 3.1% higher. The same trend for statement six, "You can learn new things, but you cannot really change your basic intelligence," occurred as 18.3% female students agreed and the whole sample had 15.6%, a difference of 2.7%. Yet, the growth mindset composite mean for female students was 3.97 (*SD* = .65), while the whole sample was *M* = 4.04 (*SD* = .64).

Table 18 shows the grit response frequencies for the female participants. The frequency distribution was quite similar to the whole group sample. High ability female students' grit composite scores ranged from 1.86 to 5.0 with $M = 3.37$ ($SD = .66$), which were data almost identical to the whole sample.

Table 18

Female Students' Grit Response Frequencies

Grit Construct Statements	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
9	3 (2.9%)	25 (24.0)	21 (20.2%)	46 (44.2%)	9 (8.7%)
10	2 (1.9%)	25 (24.0%)	30 (28.8%)	35 (33.7%)	12 (11.5%)
11	3 (2.9%)	24 (23.1%)	20 (19.2%)	43 (41.2%)	14 (13.5%)
12[a]	0 (0.0%)	1 (1.0%)	10 (9.6%)	46 (44.2%)	46 (44.2%)
13	6 (5.8%)	29 (27.9%)	34 (32.7%)	31 (29.8%)	4 (3.8%)
14	9 (8.7%)	39 (37.5%)	22 (2.1%)	24 (23.1%)	10 (9.6%)
15	3 (2.9%)	15 (14.4%)	31 (29.8%)	33 (31.7%)	22 (21.2%)
16	1 (1.0%)	2 (1.9%)	25 (24.0%)	51 (49.0%)	25 (24.0%)

Note. Grit construct statements may be found in Appendix G with the above corresponding numbers.
[a]One student did not respond to this statement.

The responses in Table 18 show the trend for female high ability students to have an average perception of grit as most of the higher percentages occurred with the response of neither disagree nor agree and agree. Although responses of agree and strongly agree occurred at a relatively high frequency for the whole sample and female students for question 15, "I finish whatever I begin", the female students' frequency of 52.9% appeared to be higher than the whole sample at 47.8%. Both groups, however, favored toward the perception of having grit for that particular question.

Statement 13 portrayed a difference in the strength of perception from the whole group sample. The question, "I often set a goal but later choose to pursue a different one," produced responses in the whole group with a frequency of 27.7% strongly disagree and disagree. For

female students, the response frequency was 33.7% strongly disagree and disagree. Within the sample, high ability female students perhaps were more inclined to report sticking with a goal that had been established than their male counterparts.

When comparing the reading overall RIT score to the whole group sample, the female student group performed lower with M = 18.79 (SD = 7.74), which was .35 lower than the whole sample. The same held true for the math overall RIT score. The female students' math overall resulted with M = 18.19 (SD = 10.71), which was 2.36 lower than the whole sample. The female students did not appear to average as high of a RIT score over the grade level norm mean.

Description of growth mindset and grit from rural school setting sample. When the teachers completed their survey, they indicated in what school setting they teach: rural, suburban, or urban. A total of 43 students were identified as rural through the coding process used to connect their answers to the appropriate teacher. Table 19 displays the rural students' response frequencies to the growth mindset portion of the survey.

Table 19

Rural School Setting Growth Mindset Response Frequencies

Growth Mindset Construct Statements	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
1	13 (30.2%)	23 (53.5%)	3 (7.0%)	3 (7.0%)	1 (2.3)
2	10 (23.3%)	24 (55.8%)	1 (2.3%)	8 (18.6%)	0 (0%)
3	0 (0%)	6 (14.0%)	4 (9.3%)	24 (55.8%)	9 (20.9%)
4	8 (18.6%)	27 (62.8%)	0 (0%)	6 (14.0%)	1 (2.3%)
5	0 (0%)	6 (14.0%)	6 (14.0%)	24 (55.8%)	7 (16.3%)
6	4 (9.3%)	17 (39.5%)	7 (16.3%)	11 (25.6%)	4 (9.3%)
7	0 (0%)	6 (14.0%)	4 (9.3%)	26 (60.5%)	7 (16.3%)
8	0 (0%)	6 (14.0%)	5 (11.6%)	26 (60.5%)	6 (14.0%)

Note. Growth mindset construct statements may be found in Appendix G with the above corresponding numbers.

When comparing the rural students' growth mindset frequencies to the whole sample, the growth mindset tendencies appeared to be somewhat similar. The growth mindset composite score for rural students mean was 3.76 (*SD* = .74). The mean was .28 lower than the whole sample and the standard deviation was more dispersed from the mean than the whole sample.

Statement three, "No matter who you are, you can significantly change your intelligence level," presented noticeable data. Rural students indicated strongly agree and agree at 76.6% frequency while the whole sample had 85.0% strongly agree and agree. The same statement elicited a 14.0% disagree response from rural students and a 6.1% disagree response from the whole sample. Some rural students indicated a fixed mindset on this particular survey statement.

Table 20 shows the rural students' grit frequency responses. Overall, it appears rural students indicated they are hard workers, diligent, and they finish what they begin. However, the grit response data also showed rural students as sometimes having difficulty completing projects as apparent in statements 11 and 14.

Table 20

Rural School Setting Grit Response Frequencies

Grit Construct Statements	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
9	1 (2.3%)	7 (16.3%)	8 (18.6%)	21 (48.8%)	6 (14.0%)
10	0 (0%)	8 (18.6%)	14 (32.6%)	17 (39.5%)	4 (9.3%)
11	1 (2.3%)	15 (34.9%)	3 (7.0%)	15 (34.9%)	9 (20.9%)
12	0 (0%)	1 (2.3%)	5 (11.6%)	19 (44.2%)	18 (41.9%)
13	3 (7.0%)	12 (27.9%)	14 (32.6%)	12 (27.9%)	2 (4.7%)
14	4 (9.3%)	18 (41.9%)	5 (11.6%)	11 (25.6%)	5 (11.6%)
15	0 (0%)	4 (9.3%)	13 (30.2%)	16 (37.2%)	10 (23.3%)
16	0 (0%)	1 (2.3%)	10 (23.3%)	20 (46.5%)	12 (27.9%)

Note. Grit construct statements may be found in Appendix G with the above corresponding numbers.

Rural students revealed a tendency to be distracted from finishing projects as indicated in the data presented for statements nine and 11. More students in the whole sample disagreed or

strongly disagreed with those statements. When comparing the fifth graders' grit descriptive statistics with the whole sample, the ranges of the composite scores appeared to differ. The rural setting range was 2.25 to 4.38, while the whole sample was 1.86 to 5.00. The means were comparable where M = 3.37 (SD = .63) for rural setting and M = 3.31 (SD = .64) for the whole sample. Rural setting high ability students' NWEA math overall composite RIT scores ranged from 2.40 to 47.10 with M = 23.14 (SD = 9.87) while the whole sample composite RIT scores ranged from -12.60 to 47.10 with M = 20.55 (SD = 10.86). Rural setting high ability students' mean math overall RIT composite was 2.59 higher than the whole sample. Rural students' reading overall RIT composite scores ranged from -12.20 to 30.90 with M = 16.59 (SD = 9.13). The highest reading overall RIT composite score and the mean score were less than the whole group sample.

Description of growth mindset and grit from suburban school setting sample. There were 117 identified high ability students in a suburban school setting who completed the online survey. Table 21 depicts the frequencies of the growth mindset responses for each Likert scale from suburban school setting students. Their answers may have suggested that they think their intelligence can change and they showed tendencies of a growth mindset.

Table 21

Suburban School Setting Growth Mindset Response Frequencies

Growth Mindset Construct Statements	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
1	48 (40.7%)	49 (41.5%)	14 (11.9%)	6 (5.1%)	1 (.8%)
2	47 (39.8%	53 (44.9%)	10 (8.5%)	6 (5.1%0	2 (1.7%)
3	3 (2.5%)	4 (3.4%)	5 (4.2%)	53 (44.9%)	53 (44.9%)
4	52 (44.1%)	52 (44.1%)	8 (6.8%)	5 (4.2%)	1 (.8%)
5	2 (1.7%)	1 (.8%)	25 (21.2%)	56 (47.5%)	34 (28.8%)
6	23 (19.5%)	60 (50.8%)	20 (16.9%)	15 (12.7%)	0 (0%)
7	1 (.8%)	5 (4.2%)	6 (5.1%)	71 (60.2%)	35 (29.7%)
8	1 (.8%)	3 (2.5%)	15 (12.7%)	66 (55.9%)	33 (28.0%)

Note. Growth mindset construct statements may be found in Appendix G with the above corresponding numbers.

When comparing the suburban school setting student data to the whole sample, the data distribution appeared quite similar. Both groups had the highest frequency of strongly agree for statements three, five, seven, and eight. All of these statements were regarding level of intelligence and being able to change it; students strongly agreed that they are able to change their level of intelligence. As a result, the strongly disagree frequencies for suburban school setting students also compared to the whole sample's frequencies with statements one, two, four, and six having the highest frequencies. These statements were related to having a fixed mindset. Students who attend school in a suburban setting, much like the whole sample, did not believe they cannot change their intelligence.

The suburban school setting frequencies indicated those students possibly had an opinion of growth mindset. That is, the mean growth mindset composite score for the whole sample was 4.04 (*SD* = .64) while the mean for high ability students in a suburban school setting was 4.16 (*SD* = .56). The suburban school setting data were more closely packed toward the mean.

Table 22 displays the frequencies of the grit responses from the high ability students in a suburban school setting. The frequencies in Table 19 verified that these students generally believed they are hard workers and are diligent. Some students, however, indicated they can become distracted or lose interest in a project, while others maintain focus.

Table 22

Suburban School Setting Grit Response Frequencies

Grit Construct Statements	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
9	3 (2.5%)	30 (25.4%)	22 (18.6%)	53 (44.9%)	10 (8.5%)
10	4 (3.4%)	24 (20.3%)	32 (27.1%)	40 (33.9%)	18 (15.3%)
11	2 (1.7%)	22 (18.6%)	26 (22.0%)	55 (46.6%)	13 (11.0%)
12	0 (0%)	0 (0%)	9 (7.6%)	67 (56.8%)	41 (34.7%)
13	3 (2.5%)	26 (22.0%)	43 (36.4%)	43 (36.4%)	3 (2.5%)
14	11 (9.3%)	44 (37.3%)	26 (22.0%)	23 (19.5%)	14 (11.9%)
15	1 (.8%)	20 (16.9%)	48 (40.7%)	34 (28.8%)	15 (12.7%)
16	2 (1.7%)	2 (1.7%)	29 (24.6%)	64 (54.2%)	21 (17.8%)

Note. Grit construct statements may be found in Appendix G with the above corresponding numbers.

The responses showed the tendency for high ability students in a suburban school setting to have an average perception of grit as most of the higher percentages occurred with the responses of neither disagree nor agree and agree. Although responses of agree and strongly agree appear to have occurred at a relatively high frequency for the whole sample and suburban school setting students for statement 12, "I am a hard worker," the high ability students in a suburban school setting frequency of 91.5% was higher than the whole sample at 50.0%. Both groups indicated a tendency of grit for that statement.

Statement 11 showed a possible difference in the strength of perception from the whole group sample. The statement, "I have been obsessed with a certain idea or project for a short time but later lost interest," produced responses in the whole sample with a frequency of 25.6% strongly disagree and disagree. For high ability students in a suburban school setting, the

response frequency was 20.3% for strongly disagree and disagree. High ability students in a suburban school setting perhaps are less inclined to keep their interest in a project for a long period of time. In other words, the whole sample indicated they do not lose interest with an idea or project, possibly indicating more grit.

The NWEA reading overall RIT composite scores for high ability students in a suburban school setting ranged from -1.20 to 48.00 with M = 20.59 (SD = 8.81). The lower end of the range of -1.20 was much higher than that of the whole sample of -12.20. The mean of the suburban school setting was 1.45 higher than the whole sample. It appears the high ability students in the suburban school settings averaged higher RIT scores on the NWEA reading achievement test than did all other students nationally. Math overall RIT composite scores do not depict the same findings as reading. High ability students in the suburban school settings that participated in this study had a range of -12.60 to 45.00 with M = 19.81 (SD = 11.89). Although the ranges were comparable, the whole sample mean was .74 higher than the suburban school setting. The standard deviations were identical at 11.89.

Description of growth mindset and grit from urban school setting sample. The total number of high ability students in an urban school setting that participated in this study was 19, which is the lowest number of any other group. Table 23 shows the growth mindset response frequencies from this group. Even though the sample size for this group was smaller than the others, the data showed the same trends toward a growth mindset.

Table 23

Urban School Setting Growth Mindset Response Frequencies

Growth Mindset Construct Statements	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
1	6 (31.6%)	6 (31.6%)	7 (36.8%)	0 (0%)	0 (0%)
2	4 (21.1%)	7 (36.8%)	5 (26.3%)	3 (15.8%)	0 (0%)
3	1 (5.3%)	1 (5.3%)	3 (15.8%)	7 (36.8%)	7 (36.8%)
4	8 (42.1%)	7 (36.8%)	4 (21.1%)	0 (0%)	0 (0%)
5	0 (0%)	2 (10.5%)	4 (21.1%)	9 (47.4%)	4 (21.1%)
6	2 (10.5%)	11 (57.9%)	4 (21.1%)	2 (10.5%)	0 (0%)
7	0 (0%)	0 (0%)	3 (15.8%)	10 (52.6%)	6 (31.6%)
8	0 (0%)	1 (5.3%)	6 (31.6%)	8 (42.1%)	4 (21.1%)

Note. Growth mindset construct statements may be found in Appendix G with the above corresponding numbers.

The response frequencies for the fixed mindset statements were in the strongly disagree and disagree categories, which is indicative of a growth mindset. To note, this group of high ability students in an urban school setting responded to statements one and four with no responses in agree or strongly agree. This was unlike any other sample. The same type of data occurred for statement seven, "No matter how much intelligence you have, you can always change it quite a bit." None of the high ability students in an urban school setting responded strongly disagree or disagree, possibly demonstrating a growth mindset.

When comparing the growth mindset composite mean, $M = 3.98$ ($SD = .67$) for the urban school setting students while the whole sample was $M = 4.04$ ($SD = .64$). These values appeared to be very comparable as the urban school setting was just .06 lower than the whole sample. Both standard deviations indicated the data were close to the mean.

Table 24 displays the response frequencies on the grit portion of the survey from high ability students in an urban school setting. The range of grit composite scores was 2.00 to 5.00 with $M = 3.29$ ($SD = .64$). With the mean value of 3.29, this indicated that the high ability

students in an urban school setting surveyed mostly neither disagreed nor agreed, perhaps demonstrating a mixed perception of grit.

Table 24

Urban School Setting Grit Response Frequencies

Grit Construct Statements	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
9	3 (15.8%)	3 (15.8%)	4 (21.1%)	8 (42.1%)	1 (5.3%)
10	2 (10.5%)	3 (15.8%)	3 (15.8%)	8 (42.1%)	3 (15.8%)
11	2 (10.5%)	4 (21.1%)	3 (15.8%)	7 (36.8%)	3 (15.8%)
12[a]	0 (0%)	0 (0%)	3 (15.8%)	11 (57.9%)	4 (21.1%)
13	2 (10.5%)	4 (21.1%)	4 (21.1%)	7 (36.8%)	2 (10.5%)
14	3 (15.8%)	4 (21.1%)	4 (21.1%)	8 (42.1%)	0 (0%)
15	2 (10.5%)	3 (15.8%)	3 (15.8%)	7 (36.8%)	4 (21.1%)
16	0 (0%)	0 (0%)	7 (36.8%)	9 (47.4%)	3 (15.8%)

Note. Grit construct statements may be found in Appendix G with the above corresponding numbers.
[a]One student did not respond to this statement.

The mean of grit composite scores was highly comparable to that of the whole sample where $M = 3.31$ ($SD = .64$). The urban school setting high ability students' mean was only .02 lower than the whole sample. Furthermore, the frequencies of responses appeared similar. Most students indicated they are hard workers. In fact, no students responded strongly disagree or disagree. Other comparable responses included agreeing to distractions from projects when presented with a new one and losing interest in a project. These types of responses possibly indicate a lack of grit.

The high ability students in an urban setting responded to statement 15 with 58.0 % agree and strongly agree whereas the whole sample responded with a frequency of 47.8%. That was 10.2% higher than the whole sample. That is, the data perhaps indicated that high ability students in an urban setting tend to finish whatever they begin more than those in the whole sample do.

The overall scores for high ability students in the urban school setting and the whole sample appear to be contrasting. The urban school setting NWEA reading overall RIT composite scores had a lower mean of 15.96 (*SD* = 6.16), which was a difference of 3.18 RIT points from the whole sample. The math overall RIT composite scores presented a similar depiction. For high ability students in an urban school setting, the range was .40 to 34.40 while *M* = 18.19 (*SD* = 8.53), which was 2.36 RIT mean points below the math overall RIT composite scores with the range of -12.6 to 47.10 from the whole sample. It appears that high ability students in an urban school setting performed lower on the NWEA than the whole sample.

Even though many of the aforementioned data were not related to my research questions, some interesting results appeared to have developed. I proceeded to conduct an inferential statistical analysis on these data. A few significant findings resulted and will be discussed later at the end of the inferential statistics section.

Inferential Statistics

In this study, an examination was conducted to determine if a student's perception of growth mindset and grit correlated with her NWEA reading or math achievement scores. This section will address the assumptions of regression analysis. Additionally, it will address each of the research questions used to guide this study by means of inferential statistical analysis. More explicitly, a simultaneous multiple regression was performed to analyze the correlation between a student's perception of growth mindset and grit and NWEA achievement scores, which addressed the overarching research question. A hierarchical multiple regression was used to analyze if the non-cognitive attributes correlated with NWEA achievement scores after taking into account teacher feedback, time spent teaching student self-regulation, and time spent with students on their individual goal setting, which addressed the remaining research questions.

Assumptions. Field (2009) emphasized the assumption of normality is important in research using regression analyses. To determine if the dependent variables, the NWEA reading and math overall achievement scores in this study, are normally distributed, a Shapiro-Wilk test was run (Field, 2009). The histograms and Q-Q plots for each content area NWEA scores provided evidence of one student score that was an outlier in each content area. These two dependent variable scores were removed from the inferential testing. As a result, the normality improved, is non-significant, and there was no violation of the assumption of normality. Tests of normality after removing outliers resulted in $p = .840$ for NWEA reading overall score and $p = .577$ for NWEA math overall score. To address multicollinearity, SPSS produced variance inflation factor (VIF) and tolerance diagnostics to determine if the predictor variables are too heavily correlated. Field (2009) suggested that values below 0.1 indicate that a predictor variable has a strong linear relationship with another predictor. For this study, the multicollinearity statistics were within limits with a VIF equal to 1.00 and a tolerance equal to .996, indicating the multicollinearity assumption was met. The Durbin-Watson test was run to determine independence of residuals. For each test, the Durbin-Watson scores fell within the range of one to three, thus indicating the assumption of independence of the residuals was met, meaning there is no correlation between the residuals within the model. Many of the assumption findings were quite similar due to the same dependent variables in the research questions. Assumptions were met for all inferential testing completed.

Due to potential concern regarding the assumption of independence within these hierarchical multiple regression tests, a linear mixed model analysis was conducted prior to running the hierarchical multiple regression tests discussed in the following sections. This was done to see whether the classroom the student was in (and the teacher he/she had) had a

significant effect on the dependent variables (NWEA reading and math RIT scores). The linear mixed model analysis for reading demonstrated a non-significant effect for the teacher these students had with Wald Z = 1.28, p = .20. Additionally, the intraclass correlation coefficient (ICC) indicated that only 5.71% of the variance within the dependent variable scores were being explained by which class they were in. Similar to the results for reading, mathematics also had a non-significant Wald Z (.88), p = .38. The ICC with the empty model for mathematics serving as a dependent variable resulted in the classroom the student was in only accounting for 4.39% of the variance within the dependent variable scores. With a non-significant effect and low ICC results, it was determined the classroom would have very little impact on the hierarchical tests that would be run. Consequently, these tests were run in the section below as planned.

Overarching question: What amount of variance do growth mindset and grit have on high ability students' academic achievement as measured by NWEA scores? The overarching research question of this study investigated the correlation of students' perceptions of growth mindset and grit to NWEA reading and math achievement scores. To analyze the correlation between these non-cognitive attributes and NWEA achievement, a simultaneous multiple regression test was used for both reading and math achievement. The model summary statistics demonstrate the strength of relationship, the amount of explained variance, and the average residual distance of each data point from the line of best fit. The multiple correlation efficient, R, was equal to .12, which demonstrates a small relationship of students' perception of growth mindset and grit to their NWEA reading achievement scores. The R^2 value, which is a measure of how much variance in the outcome is accounted for by the predictor variables, was 1.4%. Growth mindset and grit only account for 1.4% of students' NWEA reading overall achievement scores. The adjusted R^2 value, how much variance the predictors explain in the

criterion variable when adjusted for sample size and number of predictors, was 0.2% resulting in a shrinkage of the model of 1.2%. The average residual distance of each data point from the regression line, the standard error of measurement, was 8.54.

To determine if growth mindset and grit significantly predict NWEA reading achievement scores, an ANOVA test was run. Growth mindset and grit do not explain a significant amount of variance within overall reading achievement for high ability students. This was evident with a non-significant simultaneous multiple regression with F (2, 175) = 1.22, p = .299.

The model summary will also be presented for the results tied to math. In this situation, the R value was equal to .11. Because this value is not close to 1.0, it is a small relationship. Growth mindset and grit only account for 1.2% of students' NWEA math overall achievement scores as indicated by the R^2 value. The adjusted R^2 value was -0.6% indicating virtually no explained variance when the number of predictors and sample size were considered. The standard error of the estimate was equal to 10.47.

The ANOVA test was run for the math criterion as well. The results were not significant as represented by the simultaneous multiple regression test with F (2, 108) = .67, p = .516. Growth mindset and grit do not explain a significant amount of variance within overall math achievement for high ability students.

Question 2: What amount of variance do growth mindset and grit have on high ability students' academic achievement while controlling for teacher process feedback? To determine if growth mindset and grit correlate with NWEA reading achievement after taking into account teacher feedback, a hierarchical multiple regression test was conducted. When teacher feedback was entered into SPSS first to obtain the amount of variance being explained, a

correlational value of .07 resulted, showing a very small relationship to NWEA reading achievement scores. Teacher feedback accounts for 0.4% of the variance being explained within the criterion variable. The teacher feedback explained variance was removed from the model, then the two predictors were entered into SPSS. Growth mindset and grit explained 1.1% of the remaining variance as indicated by the change in R^2, while the adjusted R^2 was -0.2%. The standard error of the estimate was 8.56. These results indicate there is no correlation of teacher feedback to high ability students' NWEA reading achievement scores, nor does growth mindset and grit correlate to high ability students NWEA reading scores when controlling for teacher feedback. Furthermore, the ANOVA results did not indicate significance with F (3, 174) = .88, p = .452.

The same process was performed for the dependent variable of NWEA math scores. Once again, teacher feedback was entered into SPSS first. A correlational value of .11 was obtained showing a very small relationship of teacher feedback to high ability students' NWEA math achievement scores. The R^2 was 1.1%, indicating a minimal amount of variance being explained by teacher feedback. The adjusted R^2 was 0.2%. When removing the teacher feedback variable to determine explained variance left within the model, growth mindset and grit did not produce significant results. The R^2 value was 1.9%, which produced a 0.7% change. This is a non-significant improvement in high ability student's NWEA math achievement scores. The standard error of the estimate for growth mindset and grit was 10.48. The ANOVA results confirmed non-significance with F (3, 107) = .68, p = .565. Growth mindset and grit do not explain a significant amount of variance within overall math achievement for high ability students while controlling for teacher feedback.

Question 3: What amount of variance do growth mindset and grit have on high ability students' academic achievement while controlling for time spent teaching student self-regulation? The hierarchical multiple regression analysis performed when controlling for self-regulation elicited slightly different results. When considering self-regulation, the correlational value was .17 and the R^2 value that indicates that 2.9% of the variance in the NWEA reading overall achievement scores was being explained by how much emphasis a teacher puts on teaching self-regulation with her classroom. The ANOVA test indicated a significant amount of variance was removed based on self-regulation for NWEA reading achievement scores with F (1, 176) = 5.25, p = .023. However, when the variance explained by self-regulation was removed, growth mindset and grit did not produce a significant result for reading NWEA achievement scores. The correlational value .18 showed a small relationship between growth mindset and grit and high ability students' NWEA reading achievement scores, while the R^2 value for the model explained why 3.4% of the variance, thus indicating that the predictor variables (growth mindset and grit) only explained an additional .5% of variance over the self-regulated composite score. The standard error of the estimate was 8.47. The ANOVA test performed for growth mindset and grit, while controlling for self-regulation produced a non-significant finding with F (3,124) = 2.02, p = .113. Although self-regulation did explain a significant amount of variance within overall reading achievement for high ability students, growth mindset and grit, while controlling for self-regulation, did not. In other words, the data indicated self-regulation has a positive impact on student reading achievement scores, but growth mindset and grit do not.

The hierarchical multiple regression was also performed with self-regulation when considering high ability students' NWEA math scores. When controlling for self-regulation,

growth mindset and grit were tested to see if they were correlated with NWEA math scores. The correlational value was .13 and only 1.6% of the remaining variance of math was being explained by growth mindset and grit. The adjusted R^2 was -1.2% demonstrating fundamentally no explained variance when the number of predictors and sample size were adjusted. The standard error of the estimate was 10.50. The ANOVA test showed that growth mindset and grit, while controlling for self-regulation, produced the *F*-ratio value F (3, 107) = .57, p = .634, which showed no significant amount of variance with regard to high ability students' NWEA math achievement scores.

Question 4: What amount of variance do growth mindset and grit have on high ability students' academic achievement while controlling for time spent with students on their individual goal setting? The hierarchical multiple regression analysis performed to address the last research question yielded similar results as the previous research questions. Goal orientation was entered into SPSS initially to remove the variance it explains, which was 0%. The remaining variance explained by growth mindset and grit produced a correlational value of .18 and an R^2 value that indicated the predictor variables explained 1.4% of the variance within the reading overall RIT achievement scores. The adjusted R^2 was -0.3% demonstrating essentially no explained variance when the number of predictors and sample size were adjusted. The standard error of the estimate was 8.56. The ANOVA test showed a non-significant finding with F (3, 174) = .81, p = .492. Growth mindset and grit do not explain a significant amount of variance within NWEA reading overall achievement for high ability students while controlling for time spent with students on their individual goal setting.

The final test conducted in SPSS was completed to determine the significant amount of variance that growth mindset and grit have on high ability students' NWEA math scores while

controlling for time spent with students on their individual goal setting. Once again, goal orientation was entered into SPSS first. A correlational value of .07 was obtained showing a very small relationship between the goal orientation composite score and the high ability students' NWEA math achievement scores. The R^2 indicated that only 0.4% of the variance in the math RIT scores were being explained by the goal orientation composite score. The adjusted R^2 was -0.5%. When removing the goal orientation variable to determine explained variance left within the model, growth mindset and grit did not produce significant results. The R^2 value explained 1.5% of the variance of the criterion variable, which produced a 1.1% change. This is a non-significant correlation with high ability students' NWEA math achievement scores. The standard error of the estimate for growth mindset and grit was 10.50 over the amount of explained variance that goal orientation achieved. The ANOVA results confirmed non-significance with F (3, 107) = .55, p = .652. Growth mindset and grit do not explain a significant amount of variance within math overall achievement for high ability students while controlling for time spent with students on their individual goal setting.

Emerging data and the inferential findings. After looking at the descriptive data found earlier in this chapter, two emerging findings arose in addition to the findings regarding my research questions. It became evident that there was quite a difference between the males and females in their math composite scores. The other noticeable difference was *school setting* seemed to play a role on *growth mindset* in which the suburban setting was higher than the rural setting. Because these differences appeared evident, I decided to statistically test those two emerging findings. For the first test regarding gender, an independent samples *t*-test was performed. This was done because there were only two levels on the independent variable: male and female. For the test focusing on *school setting* compared to *growth mindset*, a one-way

ANOVA was run because there were three levels on the independent variable: rural, suburban, and urban. With three levels on the independent variable, this would result in three different comparisons needed: urban versus suburban, urban versus rural, and suburban versus rural.

As mentioned, an independent samples *t*-test was conducted to determine whether significant differences exist on math composite scores based on the gender of the participant. The assumption of homogeneity of variance was determined by a Levene's Test for Equality of Variances and met with $p = .77$. The assumption of normality was met with non-significant Shapiro Wilks test, $p > .05$. The dependent variable scores within this question were only in one level of the independent variable. In other words, every math score used was either a male's score or a female's score; there was no duplication.

The males' math composite score ($M = 23.80$, $SD = 10.31$) was significantly higher than the females' math composite score ($M = 18.68$, $SD = 10.06$). This is evident with a significant independent samples *t*-test with $t\ (109) = 2.63$, $p = .01$, two-tailed. High ability male students significantly outperformed the female students who participated in this study.

The other noticeable finding in the descriptive data pertained to *school setting* and its potential comparison to *growth mindset* composite scores. To further examine how *school setting* possibly compared to *growth mindset* composite scores, the one-way ANOVA test was run. I ran this statistical test so it can be determined whether the differences seen in the descriptive data are due to chance or a significant difference does exist.

The assumption of homogeneity of variances was violated with a significant Levene's Test of Homogeneity of Variances, with $F\ (2, 177) = 3.26$, $p = .041$. The one-way ANOVA is robust to the violation of assumption of homogeneity of variances, but to accommodate for such a violation, the Games-Howell test was utilized to interpret any significant findings. The Games-

Howell post hoc test does not assume equal variances among the dependent variable scores on level of the independent variable.

The one-way ANOVA produced statistically significant data as F (2, 177) = 6.6, p = .002. To determine which groups within the one-way ANOVA were significant, the Games-Howell output was examined due to the violation of assumption of homogeneity of variances. The students in a suburban setting (M = 4.16, SD = .56) scored significantly higher than those students in a rural setting (M = 3.76, SD = .74). The mean difference was significant with p = .001. That is, those students in a suburban setting exhibited significantly higher levels of growth mindset than those students in a rural school setting in this particular study.

Summary

The descriptive statistics presented in this chapter appear to have demonstrated students in grades 4 through 8 have the propensity of a growth mindset as revealed by the growth mindset composite mean scores for each grade level. It appears the growth mindset composite scores decreased as the grade level increased. Unfortunately, when I attempted to run an inferential statistical analysis, I was unable to do so because the samples sizes per grade level were not conducive to such testing. When considering gender, it appears males tended to have higher values on the growth mindset composite scores more than females. These data were found significant through inferential statistical analysis. The students in the suburban school setting displayed the highest growth mindset mean and that mean was also higher than the whole sample. Significant findings through inferential statistical testing showed students in a suburban school setting displayed higher levels of growth mindset than those students in a rural school setting.

The inferential data directly related to my research questions did not present significant findings. Neither growth mindset nor grit explained a significant amount of variance on high ability students' academic achievement when controlling for teacher feedback, self-regulation, or goal orientation. However, it should be noted that when controlling for self-regulation, the ANOVA test indicated a significant amount of variance was removed based on self-regulation for NWEA reading achievement scores. This will be discussed more in Chapter Five. Additionally, Chapter Five will discuss the findings in this chapter and how they relate to the review of literature, practical implications, and recommendations for future research.

CHAPTER FIVE

CONCLUSIONS

This study conveyed the relationship between identified high ability students' perceptions of growth mindset and grit and their academic achievement as indicated by NWEA MAP growth RIT composite scores. Chapter Five begins with a summary of the study including an overview of the problem, research questions, and purpose of the study. The following sections will address the review of methodology and the major findings. The chapter will then proceed with findings related to the literature, other emerging and interesting data, and conclusions with implications for practice, recommendations for future research, and concluding remarks.

Overview of the Problem

The underachievement of identified high ability students has been an increasingly perplexing circumstance. Van Tassel-Baska (2000) reported that 63% of high ability students are underachieving. Additionally, Landis and Reschly (2013) conveyed the startling occurrence of underachieving high ability students' disengagement in school and consequential dropout rates. Most recently, the Indiana Department of Education reported that identified high ability students in grades 3 through 8 earning Pass+ on the 2017 Indiana Statewide Testing for Educational Progress-Plus (ISTEP+) examination was an average of 65.2% in English Language Arts and an average of 58.5% in math. High ability students do not seem to be achieving to their potential. Moreover, female students have a tendency to underachieve in math more so than male students do. While high ability students vary in cognitive ability, they can also vary in the non-cognitive attributes they possess, which include growth mindset and grit (Duckworth, 2016; Duckworth & Gross, 2014; Duckworth et al., 2007; Dweck, 2006, 2007, 2010). This study

addressed whether growth mindset and grit have a correlation with high ability students' academic achievement.

Purpose of the Study

The purpose of this study was to determine what non-cognitive attributes correlate with academic achievement of identified high ability students in fourth through eighth grades while controlling for the intervening variables of teacher feedback, student self-regulation, and goal orientation. The independent variables were the non-cognitive attributes of grit and growth mindset. The dependent variables were the measurements from student and teacher responses obtained from a five-point Likert scale survey and the students' Northwest Evaluation Association (NWEA) achievement scores.

Research Questions

The central, or overarching, question guiding this study was:

1. What amount of variance do growth mindset and grit have on high ability students' academic achievement as measured by NWEA scores?

The following sub-questions guided research and data analysis for this study:

2. What amount of variance do growth mindset and grit have on high ability students' academic achievement while controlling for teacher process feedback?

3. What amount of variance do growth mindset and grit have on high ability students' academic achievement while controlling for time spent teaching student self-regulation?

4. What amount of variance do growth mindset and grit have on high ability students' academic achievement while controlling for time spent with students on their individual goal setting?

Review of Methodology

This study was a quantitative correlational design using online survey data and high ability students' NWEA achievement scores. The data collected for this study were provided by identified high ability students in grades 4 through 8 and their teachers from four Indiana school districts. The student and teacher surveys were completed within the same timeframe as the NWEA tests were taken by the students in order to complete this cross-sectional study.

To analyze the relationship between students' perceptions of growth mindset and grit and their academic achievement, a simultaneous multiple regression analysis was used. This provided a mathematical explanation of a relationship and the contributions of predictor variables in terms of explained variance. A hierarchical multiple regression was also utilized to determine if the non-cognitive attributes correlated with academic achievement while controlling for teacher feedback, time spent teaching student self-regulation, and time spent with students on their individual goal setting. These intervening variables were entered into SPSS first to remove the amount of variance they explained. Growth mindset and grit were then analyzed for the significant amount of variance explained within the remaining variance.

Assumptions for regression testing were analyzed to ensure the validity of the findings. A Shapiro-Wilk test was run to determine if the dependent variables, the NWEA reading and math overall achievement scores in this study, were normally distributed. To address multicollinearity, SPSS produced variance inflation factor (VIF) and tolerance diagnostics to determine if the predictor variables were too heavily correlated. The Durbin-Watson test was run to determine independence of residuals; there was no correlation between the residuals within the model. Many of the assumption findings were quite similar due to the same dependent variables in the research questions.

Due to potential concern regarding the assumption of independence within these hierarchical multiple regression tests, a linear mixed model analysis was conducted prior to running the hierarchical multiple regression tests. This was run to see whether the classroom the student was in (and the teacher he/she had) had a significant effect on the dependent variables of the NWEA reading and math RIT scores. With a non-significant effect and low ICC results, it was determined the classroom and teacher would have very little impact on the hierarchical tests to be run.

Additionally, because the descriptive data presented interesting findings with regard to gender and math achievement and school setting and growth mindset composite scores, more inferential statistical analysis was conducted. An independent samples *t*-test was performed because there were only two levels on the independent variable of gender. For the test focusing on *school setting* compared to *growth mindset*, a one-way ANOVA was run because there were three levels on the independent variable: rural, suburban, and urban school setting.

Major Findings

The following is a brief description of the findings supported in this research.

- This study did not produce statistically significant findings when analyzing the correlation between high ability students' growth mindset and grit and their reading and math academic achievement.
- Teacher feedback did not remove a significant amount of variance from the model. After teacher feedback was removed from the model, neither growth mindset nor grit explained a significant amount of variance. That is, there is no correlation of teacher feedback to high ability students' NWEA reading achievement scores, nor does growth mindset and grit correlate to high ability

students NWEA reading scores when controlling for teacher feedback.

- Self-regulation did produce a significant amount of variance for NWEA reading achievement scores. However, when the variance explained by self-regulation was removed, growth mindset and grit did not produce a significant result for reading NWEA achievement scores. In other words, the data indicated self-regulation has a positive impact on student reading achievement scores, but growth mindset and grit do not. The ANOVA test showed that growth mindset and grit, while controlling for self-regulation, showed no significant amount of variance with regard to high ability students' NWEA math achievement scores.
- Goal orientation did not remove a significant amount of variance from the model. After goal orientation was removed from the model, growth mindset and grit did not explain a significant amount of variance within NWEA reading and math overall achievement for high ability students while controlling for time spent with students on their individual goal setting.
- Although not initially associated with the research questions, some descriptive data emerged as interesting and worthwhile of further statistical analysis and discussion.
    - There was quite a difference between the males and females in their math composite scores. This was evident with a significant independent samples *t*-test ($p = .01$). High ability male students significantly outperformed the female students who participated in this study.
    - The other noticeable finding in the descriptive data pertained to *school setting* and its potential comparison to *growth mindset* composite scores.

A Games-Howell Howell post hoc test did not assume equal variances among the dependent variable scores on level of the independent variable. The one-way ANOVA produced statistically significant data (p = .002). Those students in a suburban setting exhibited significantly higher levels of growth mindset than those students in a rural school setting in this study.

Findings Related to the Literature

Previous studies investigated relationships between students' growth mindset and their academic achievement, as well as students' grit and its impact on academic achievement. These studies had indistinct research findings that were expressed as varying and contradictory. By investigating the correlation between high ability students' non-cognitive attributes of growth mindset and grit and the students' NWEA achievement scores, this particular study set out to clarify the contradictions found in previous research. Furthermore, this study was conducted to address the gap in literature by providing an investigation concentrating on identified high ability students.

Several differences exist between this study and the studies described in Chapter Two. This study was focused on high ability students' growth mindset and grit perceptions and how those affected their reading and math achievement scores. Specifically, this study investigated the correlation of fourth through eighth grade high ability students' levels of growth mindset and grit with their NWEA reading and math RIT scores at four different Indiana public school districts. The results of this study, in relation to the literature, are presented by addressing each research question.

Overarching question: What amount of variance do growth mindset and grit have on high ability students' academic achievement as measured by NWEA scores? The first research question sought to understand how high ability students' growth mindset and grit influence their reading and math achievement scores. The model summary results suggested that growth mindset and grit have a very small impact on reading and math NWEA achievement scores. Additionally, non-significant data resulted from the ANOVA tests conducted for reading and math. That is, growth mindset and grit did not explain a significant amount of variance with the overall reading and math achievement scores for the participating group of high ability students.

While Yeager and Walton (2011) have claimed that growth mindset can have "striking effects on educational achievement" (p. 268), other results do not support these claims. Costa's and Faria's meta-analysis (2018) showed a significant yet low association between students' growth mindset and their academic achievement. However, Sisk, Burgoyne, Sun, Butler, and Macnamara (2018) contended that growth mindset does not benefit both high- and low-achieving students. These most recent claims coincide with the results of this study as indicated by the non-significant simultaneous multiple regression data provided in Chapter Four.

Research has highlighted that growth mindset may have particular importance in challenging academic situations. Esparza et al. (2014) declared high ability students with a growth mindset persevere when confronted with failure, consider challenge as an opportunity to grow, put forth more effort to become better. Growth mindset interventions are low cost and take little time (Yeager & Walton, 2011). There may be an overall benefit for high ability students' academic achievement if educators teach high ability students about neuroplasticity

(Dweck, 2012; Ricci, 2013). Their response to failure may change, eliciting more effort and perseverance when faced with academic adversity.

Grit studies have produced the same varied results where some researchers have indicated grit's positive correlation with academic achievement (Duckworth et al., 2007) and other non-cognitive attributes, particularly growth mindset (Perkins-Gough, 2013; Dockterman & Blackwell, 2014). As with this study, other studies have negated the positive correlation of grit with academic achievement (Crede et al., 2016; Dixson et al., 2016). A possible reason for this is even though Duckworth and her colleagues have shown the two aspects of grit factor separately, most researchers examining its predictive validity used a total score for grit, which was done in this study as well. When the two subscales are considered separately, perseverance of effort relates more strongly to achievement than does consistency of interests (Crede et al., 2016).

Regardless of the publicity, grit, at least as measured by the Grit-S scale, does not seem to be a significant predictor of high ability students' academic achievement. Crede et al.'s findings (2016), along with the findings in this study, imply that it is unnecessary to promote the use of interventions to boost high ability students' grit as a way to foster their academic achievement. Being *gritty* may be advantageous for pursuing long-term goals beyond academic achievement, such as winning the Scripps National Spelling Bee or completing basic training at West Point. However, grit does not appear to impact short-term academic achievement of high ability students as demonstrated by the NWEA scores in this study.

Question 2: What amount of variance do growth mindset and grit have on high ability students' academic achievement while controlling for teacher process feedback?

The second research question was developed to gain better insight as to how high ability

students' growth mindset and grit correlated with their reading and math achievement scores after taking into account teacher feedback. This study did not indicate a statistically significant amount of correlation between high ability students' growth mindset and grit and their reading and math academic achievement while controlling for teacher feedback. Teacher feedback did not remove a significant amount of variance from the model, nor did growth mindset and grit show a significant variance on this sample of high ability students' reading and math academic achievement.

In Chapter Two, the review of literature presented varied results in regards to the relationship between teacher feedback and students' growth mindset and subsequent academic achievement. Several studies reported teachers who provide process feedback to students promote a growth mindset, whereas praising students for their intelligence induces a fixed mindset (Dockterman & Blackwell, 2014; Dweck, 2007, 2012; Haimovitz & Dweck, 2017; Mueller & Dweck, 1998). Conversely, Schunk (1996) concluded that intelligence praise had a more beneficial effect on students' academic achievement. Aligning with Schunk's findings, Snyder et al. (2013) found no significant correlation between high ability students and their implicit beliefs about intelligence as no differences were revealed in mindsets between high ability students' high ability label and the praises they were given about their ability. Li and Bates (2017) conducted a study in which praise for effort was utilized as a growth mindset intervention did produce significant data, $p = .63$. These results closely align with the results of this study. It appears the impact of teacher feedback and growth mindset on academic achievement may be exaggerated.

The type of teacher feedback given to students and its effect on their perception of grit has been debated. Lam et al.'s (2008) study did not confirm if intelligence praise or effort praise

was better for students' academic achievement. That is, the type of feedback a student best responds to depends on the students' perceptions of effort and ability. It may be that students need to establish their beliefs about the relationship between effort and ability because those beliefs will determine the effects of effort praise.

The data considered in this study included the teacher survey portion pertaining to process feedback that consisted of five questions where the focus was on the amount of time given to providing process feedback to students. Hattie and Timperley (2007) reported there are several facets to student feedback, one of which is process feedback. The other aspects of effective feedback include feedback to the task or product, feedback that is focused on self-regulatory behaviors that include self-evaluation to engage further in a task, and personal feedback that can be unrelated to performance of a task, which is similar to intelligence praise. Hattie and Timperley emphasized these four aspects of teacher feedback must all be utilized to influence students to engage deeply, purposefully, and persevere throughout the learning process.

This study did not confirm the use of teacher process feedback neither positively impacts high ability students' perceptions of growth mindset or grit nor their academic achievement. Perhaps the teacher survey used in this study did not obtain the feedback most accurately; classroom observations may have gathered more accurate data than that of a teacher self-reporting through a Likert scale survey. Also, a longitudinal study, as opposed to a cross-sectional study, may be better suited for measuring how teacher feedback correlates with students' growth mindset and subsequent academic achievement. In this way, the researcher may obtain pre- and post- scores of high ability students' growth mindset perceptions after being exposed to process feedback.

Question 3: What amount of variance do growth mindset and grit have on high ability students' academic achievement while controlling for time spent teaching student self-regulation? The purpose of the third research question was to determine how high ability students' growth mindset and grit correlated with their reading and math achievement scores after taking into account the time spent emphasizing student self-regulation. This study did not indicate a statistically significant amount of correlation between high ability students' growth mindset and grit and their reading and math academic achievement while controlling for student self-regulation. However, student self-regulation did remove a significant amount of variance from the model for the area of reading, but not math. Growth mindset and grit did not show a significant amount of variance on this sample of high ability students' reading and math academic achievement.

Although there was not any significant data regarding growth mindset and grit and high ability students' reading and math academic achievement while controlling for self-regulation, there was statistically significant data with self-regulation and reading achievement. Ariani (2016) stated self-regulation positively influences motivation and self-efficacy. That interrelationship correlates to academic achievement. Other researchers, such as Schunk and Zimmerman (2007) contended that self-regulation has reciprocal interactions between the person, environment, and behaviors. For example, the influence of behavior on personal variables can be seen in a student who successfully read a difficult book and experiences higher self-efficacy and motivation to try reading another book of comparable Lexile. Behaviors can affect the environment in which the student learns. A teacher may inspire a student to read difficult books when creating a favorable classroom environment by giving students adequate feedback and encouragement. These interactions that self-regulation has with other attributes

and environmental factors create many facets to self-regulation. It is difficult to hone in one strategy that fosters self-regulation in students. Rubenstein et al. (2012) recommended making learning more relevant and meaningful. High ability students already have the skills to be successful, but some choose to opt out because their learning tasks are not relevant.

The self-regulation strategies specifically used by the participating teachers in this study are unknown. The teacher survey questions only skimmed the surface of self-regulation strategies; however, it may be assumed they are promoting self-regulated learning, coaching students how to cope with academic difficulties they may face in the classroom, modeling self-regulation strategies, and providing quality feedback to their students. Based on research (Ariani, 2016; Schunk & Zimmerman, 2007; Wolters & Hussain, 2015), self-regulated learning encompasses many strategies such as those highlighted in the teacher survey used in this study.

Although growth mindset and grit did not remove a significant amount of variance while controlling for self-regulation in this model, other research has shown self-regulated learning to serve as an intervening approach through which grit is associated with better academic results (Wolters & Hussain, 2015). Wolters and Hussain asserted students with increased grit, particularly perseverance of effort, academically perform better because they are more confident, effectively manage when and where to study, and do not procrastinate. With grit being a common topic for discussion in education today, future research that assesses grit, self-regulation, and academic achievement may provide useful insight to high ability education.

Question 4: What amount of variance do growth mindset and grit have on high ability students' academic achievement while controlling for time spent with students on their individual goal setting? The fourth research question sought to understand how high ability students' growth mindset and grit correlated with their reading and math achievement

scores after taking into account student goal orientation. This study did not indicate a statistically significant amount of correlation between high ability students' growth mindset and grit and their reading and math academic achievement while controlling for goal orientation. Setting goals did not remove a significant amount of variance from the model, nor did growth mindset and grit show a significant amount of variance on this sample of high ability students' reading and math academic achievement.

High ability students may set performance goals or mastery goals. Some researchers believe students set goals based on the type of feedback they receive. Mueller and Dweck (1998) contended students who are praised for their intelligence may adopt performance goals. On the other hand, Dweck (2017) concluded providing effort or process feedback led to increased growth mindset and mastery goals. Perhaps because teacher feedback did not remove a significant amount of variance from this model, neither did goal orientation.

The classroom setting in which high ability students are placed may affect goal orientation outcomes. Chessor (2014) studied high ability students who were grouped in two different settings: mixed ability and a homogeneous group. The high ability students in the homogeneous classroom setting oriented to performance goals. Robinson and Clinkenbeard (1998) confirmed this result aligns with characteristics of identified high ability students, as they want to preserve their self-worth. In this particular study, I do not know if the participating students were in mixed ability or homogeneous classrooms, which may have affected their goal orientation tendencies.

Grant and Dweck (2003) noted that other studies have failed to confirm increased academic achievement as a result of learning goals. This statement supports the data in this study as the NWEA RIT scores did not correlate with goal orientation as noted by a lack of

statistically significant data. Additionally, a relationship between a student's achievement goal orientation and a test score (NWEA in this study) is not always direct or apparent (Dull et al., 2015). Goal orientation may be a combination of performance and mastery goals for students to experience academic success.

Emerging data and the inferential findings. As noted in the descriptive statistics, there were higher mean scores in some instances. My curiosity led to an inferential analysis of these emerging findings. Although these findings were not addressed with the above research questions, they became evident and are interesting to discuss. One finding of particular interest was the statistically significant data regarding gender and math NWEA achievement scores. High ability male students significantly outperformed the female students who participated in this study.

A study conducted by Cvencek, Meltzoff, and Greenwald (2011) in elementary school children distinguished between math-gender stereotypes and math self-concepts. The findings presented two items that must be addressed. First, the math-gender stereotype that had been found to be prevalent in adults was found in the elementary level. Second, elementary school girls showed a weaker identification with math than boys did. One can conclude that math-gender stereotype develops early and differentially influences boys' versus girls' self-identification with math prior to ages at which differences in math achievement begin (Cvencek et al., 2011).

Another study conducted in elementary-aged children also identified a gender gap in math achievement. Beilock, Gunderson, Ramirez, Levine, and Smith (2010) conducted a study to determine if female teachers' math anxiety influenced the math achievement of their students. Interestingly, by the end of the school year, the more anxious teachers were about math, the more

likely girls (not boys) felt they were not good at math and their math achievement scores were significantly lower than the boys' math scores. According to the U.S. Department of Education, most teachers are female. In a 2011-2012 Schools and Staffing Survey (SASS), 76.3% of the teachers in public schools across the United States were female. In Indiana, 77.2% of the teachers in public schools were female. If many female elementary teachers have math anxiety, then our girls in elementary grade levels may be more likely to experience math anxiety as well and develop an implicit belief they cannot do math. This could be detrimental as girls mature and turn away from STEM-related careers.

Not only has research been conducted to explore gender discrepancies in math achievement, but also in ambitions to pursue STEM. Females tend to lose interest in pursuing a STEM career while in high school (Sadler, Sonnert, Hazari, & Tai, 2012). Moreover, males greatly outnumber females in STEM majors, although great strides have been made in the area of biology, which may be considered a less mathematically intensive STEM field (Ceci & Williams, 2010).

Degol, Wang, Zhang, and Allerton's study (2017) examined how growth mindset, motivation, and gender play a role in predicting math achievement and STEM career ambitions. Overall, the findings presented females with growth mindsets excelled more at math more strongly than males. This may suggest that even with the efforts to improve female math performance, implicit beliefs about math may continue to act as a barrier to academic math performance for many females. An implication from Degol et al.'s study is to promote the malleability of math intelligence as an effective strategy in order to increase the number of females in mathematically intensive STEM careers.

The other interesting data that arose during my study are the correlation between *school setting* and *growth mindset*. Those students in a suburban school setting had significantly higher levels of growth mindset than students in a rural school setting. Perhaps the students in the suburban school setting were exposed to lessons pertaining to growth mindset and the rural students were not. Additionally, I had no control of how much, or if at all, parents spoke to their children about growth mindset. Future studies may specifically correlate school setting with growth mindset and compare what resources the school settings have that promote growth mindset. However, with the implementation of the Indiana Department of Education's new graduation pathways, all students, regardless of their school setting, should be taught about growth mindset. The Indiana Department of Workforce Development has set Indiana's employability skills benchmarks, one of which is mindsets.

Practical Implications

Three primary implications result from this research study. The first is the significance of self-regulated learning and its relationship with high ability students' reading achievement. Educators should note the importance of promoting self-regulation in high ability classrooms. Not only was there a significance found with reading achievement in this study, but other studies have also shown self-regulation to benefit students' self-efficacy, time management, help seeking, and self-evaluation (Lai, Hwang, & Tu, 2018). High ability teachers can foster self-regulation in their classrooms by creating a culture where students are comfortable taking more responsibility for their own learning, providing students with effective examples of self-regulation to emulate. Self-regulation can be influenced by interventions such as providing students with constructive feedback on their efforts (Chung & Yuen, 2011). Feedback can be an effective incentive for learning and promoting an autonomous learner. Butler and Winne (1995)

affirmed that feedback is a catalyst in every self-regulated activity, prompting student engagement in self-regulated learning. Self-regulation in high ability classrooms may be a powerful instructional strategy not only for positively impacting reading achievement, but also for influencing non-cognitive attributes that have been associated with academic achievement.

Although not directly related to the research questions, a second implication from this study stems from the statistically significant data regarding gender and math achievement. High ability male students significantly outperformed the female students who participated in this study. Several studies presented findings pertaining to math-gender stereotypes, fewer females in math-related STEM fields, and how female students with growth mindset perform better than male students in math (Beilock et al., 2010; Ceci & Williams, 2010; Cvencek et al., 2011; Degol et al., 2017). High ability educators should be mindful of math-gender discrepancies in achievement and mathematically intensive STEM careers.

Educators can reduce these discrepancies by promoting the malleability of math intelligence through growth mindset interventions. This is supported by a recent research study conducted by Mofield and Parker Peters (2018). The study compared mindset beliefs, perfectionism, and achievement attitudes among high ability, advanced, and typical students. Findings suggested that high ability students are not more vulnerable to develop fixed mindsets. By cultivating the incremental belief that intelligence can change and develop, a student's focus can be reframed from safeguarding a smart identity to a focus on learning and improvement. Additionally, school administrators who supervise high ability programming, particularly at the elementary level, must provide appropriate professional development so teachers develop both strong math skills and positive math attitudes. It is imperative that rigorous work is provided to

elementary-aged high ability students so they can develop positive attitudes toward effort and failures while learning.

The third implication of this study comes from the growth mindset results in a suburban school setting. Students in a suburban school setting significantly presented higher levels of growth mindset than those students in a rural setting. Although I do not know if these students were taught about growth mindset or not, they still displayed higher perceptions of growth mindset. Implicit theories of intelligence (Blackwell et al., 2007: Dweck & Leggett, 1988; Haimovitz & Dweck, 2017) relate to a student believing if intelligence is malleable or fixed. Although there was no statistically significant correlation of growth mindset to reading or math academic achievement in this study, growth mindset in high ability students is evident in this study. Taking into consideration the findings presented in the review of literature, growth mindset is too important to ignore. As children grow and develop, they become more capable of thinking about the relationship between effort and ability (Dweck, 2006; Muenks & Miele, 2017). Therefore, it is important for high ability teachers to promote growth mindset in their classrooms so students believe their intelligence can continue to change, whether it is in reading or math. High ability education should include teaching students about neuroplasticity (Dweck, 2012; Ricci, 2013). Students' beliefs about intelligence may change, eliciting more effort and perseverance when faced with academic adversity, which may positively influence overall academic achievement.

Recommendations for Further Research

Several areas should be considered to further expand the investigation of this topic in order to better understand the correlation between growth mindset and grit and high ability students' academic achievement. The areas worth further investigation include investigating a

larger sample size, investigating this topic using the four non-cognitive attributes discussed in Chapter Two, conducting this study through a longer period to obtain growth results, and conducting this study using the Grit-S subscales separately. These recommendations are further explained in the following paragraphs.

This study included 180 identified high ability students in grades 4 through 8 from four Indiana school districts. Using only four grade levels limited the study. In order to more fully investigate the relationship between growth mindset and grit and high ability students' academic achievement, expanding the student participants to grade 12 and including other states would increase the sample size. By obtaining a larger sample size, a researcher may be able to compare ethnicities and socioeconomic status to determine whether those factors influence growth mindset and grit.

An additional recommendation for future research study is to investigate the four non-cognitive attributes discussed in the literature review: grit, growth mindset, intrinsic motivation, and self-efficacy. Based on research, these four non-cognitive attributes are interrelated and coupled in some way. Omitting intrinsic motivation and self-efficacy may be one reason growth mindset and grit were found statistically non-significant. One may assume that growth mindset and grit are stand-alone variables, but they may not be without the others in tandem. Future research using all four non-cognitive attributes may provide further insight of how they correlate with high ability students' academic achievement.

Another recommendation for future research is to expand this type of study over a longer period to analyze growth. That is, this study was a cross-sectional analysis where the data were collected simultaneously. I suggest an experimental design where pre- and post-collection in which students complete the Likert survey regarding growth mindset and grit at the beginning of

an academic year. As previously mentioned, I did not have any control as to whether students who participated in this study were taught growth mindset and grit. An experimental design would allow for one group of high ability students to be taught growth mindset and grit strategies throughout the academic year while the other group of high ability students were not. At the end of the academic year, the survey would be completed again and academic achievement scores from each group of students would be compared.

This study utilized the Grit-S scale to obtain participating students' grit perceptions. However, the scale was used to find a total composite score rather than using the subscales for perseverance of effort and consistency of interests. Crede et al.'s study (2016) indicated that when the two subscales are considered separately, perseverance of effort relates more strongly to achievement than does consistency of interests. Because academic achievement was a dependent variable in this study, it is highly recommended to use the Grit-S subscales independently to obtain more reliable student data in relationship to academic achievement.

As previously mentioned in Chapter Three, a limitation of this study was not controlling for the role of parents' influence on their child's perception of growth mindset or grit. It would be interesting to be able to see how much we could control for the parent variable. It is recommended that parents complete a survey answering questions regarding their own growth mindset and grit. This would enable the researcher to determine if the parent variable is an important contributing factor to their children's growth mindset and grit.

Concluding Remarks

The purpose of this study was to determine if growth mindset and grit correlated with identified high ability students' academic achievement while controlling for teacher feedback, self-regulation, and goal orientation. Although the findings of this study did not demonstrate a

significant correlation between students' growth mindset and grit and their reading and math achievement scores, other research has shown growth mindset and grit to correlate with academic achievement (Duckworth, 2016; Duckworth & Gross, 2014; Duckworth, Peterson, Matthews, & Kelly, 2007; Dweck, 2006, 2007, 2010).

The statistically significant results of this study indicated that self-regulation does positively correlate to high ability students' reading achievement. Promoting self-regulated learning in high ability classrooms is beneficial not only to students' reading achievement, but also to their motivation, self-efficacy, and effort (Ariani, 2017; Mega et al., 2014). Other statistically significant data suggest a need to promote mathematical mindsets in female students so they may not only perform better academically, but also choose STEM-oriented careers. School settings may influence students' perceptions of growth mindset. Due to guidelines set forth by Indiana officials, all students should be taught employability skills, including mindset and perseverance. All in all, I believe strategies to foster growth mindset and grit in high ability students should be in every educator's toolkit.

References

Ahmavaara, A., & Houston, D.M. (2007). The effects of selective schooling and self-concept on adolescents' academic aspiration: An examination of Dweck's self-theory. *The British Journal of Educational Psychology, 77*(3), 613-632.

Aiken, L.S., & West, S.G. (1991). *Multiple regression: Testing and interpreting interactions.* Thousand Oaks, CA: Sage.

Ariani, D.W. (2016). Why do I study? The mediating effect of motivation and self-regulation on student performance. *Business, Management and Education, 14*(2), 153-178. doi: 10.3846/bme.2016.329

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84,* 191-215.

Bandura, A. (1986). *Social foundations of thought and action.* Upper Saddle River, NJ: Prentice Hall.

Bandura, A. (1995). *Self-efficacy in changing societies.* New York, NY: Cambridge University Press.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York, NY: W.H. Freeman and Company.

Barker, G.P., & Graham, S. (1987). Developmental study of praise and blame as attributional cues. *Journal of Educational Psychology, 79*(1), 62-66.

Baron, R.M., & Kenny, D.A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51,* 1173-1182.

Beilock, S.L., Gunderson, E.A., Ramirez, G., Levine, S.C., & Smith, E.E. (2010). Female teachers' math anxiety affects girls' math achievement. *Proceedings of the National Academy of Sciences of the United States of America, 107*(5), 1860-1863.

Blaas, S. (2014). The relationship between social-emotional difficulties and underachievement of gifted students. *Australian Journal of Guidance and Counselling, 24*(2), 243-255. doi: 10.1017/jgc.2014.1

Blackwell, L.S., Trzesniewski, K.H., & Dweck, C.S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child Development, 78*(1), 246-263.

Butler, D.L., & Winne, P.H. (1995). Feedback and self-regulated learning: A theoretical synthesis. *Review of Educational Research, 65*(3), 245-281.

Cassidy, S. (2015). Resilience building in students: The role of academic self-efficacy. *Frontiers in Psychology, 6,* 1781.

Ceci, S.J., & Williams, W.M. (2010). Sex differences in math-intensive fields. *Current Directions in Psychological Science, 19*(5), 275-279.

Cheema, J.R., & Galluzzo, G. (2013). Analyzing the gender gap in math achievement: Evidence from a large-scale U.S. sample. *Research in Education, 90,* 98-112.

Chessor, D. (2014). The impact of grouping gifted students on motivation. *The European Journal of Social & Behavioural Sciences, 8*(1), 1334-1352.

Chung, Y.B., & Yuen, M. (2011). The role of feedback in enhancing students' self-regulation in inviting schools. *Journal of Invitational Theory and Practice, 17,* 1722-1727.

Claro, S., Paunesku, D., & Dweck, C. S. (2016). Growth mindset tempers the effects of poverty on academic achievement. *Proceedings of the National Academy of Sciences of the United States of America, 113*(31), 8664-8668. doi: 10.1073/pnas.1608207113

Clinkenbeard, P. (1994). Motivation and highly able students: Resolving paradoxes. In A.H. Passow & S.M. Hoover (Eds.), *Talent development: Theories and practice* (pp. 187-202). Dubuque: Kendall/Hunt.

Clinkenbeard, P.R. (1996). Research on motivation and the gifted: Implications for identification, programming, and evaluation. *Gifted Child Quarterly, 40*(4), 220-221.

Clinkenbeard, P.R. (2012). Motivation and gifted students: Implications of theory and research. *Psychology in the Schools, 49*(7), 622-630. doi: 10.1002/pits.21628

Coladarci, T., & Cobb, C.D. (2014). *Fundamentals of statistical reasoning in education*. Hoboken, NJ: John Wiley & Sons, Inc.

Costa, A., & Faria, L. (2018). Implicit theories of intelligence and academic achievement: A meta-analytic review. *Frontiers in Psychology, 9*(829), 1-16.

Couper, M.P., & Miller, P.V. (2008). Web survey methods: Introduction. *The Public Opinion Quarterly, 72*(5), 831-835.

Crede, M., Tynan, M.C., & Harms, P.C. (2016). Much ado about grit: A meta-analytic synthesis of the grit literature. *Journal of Personality and Social Psychology,* doi: 10.1037/pspp0000102

Creswell, J.W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches.* Thousand Oaks, CA: Sage.

Croasmun, J. T., & Ostrom, L. (2011). Using Likert-type scales in the social sciences. *Journal of Adult Education, 40*(1), 19-22.

Cvencek, D., Meltzoff, A.N., & Greenwald, A.G. (2011). Math-gender stereotypes in elementary school children. *Child Development, 82*(3), 766-779.

Day, S.L., & Connor, C.M. (2017). Examining the relations between self-regulation and achievement in third-grade students. *Assessment for Effective Intervention, 42*(2), 97-109. doi: 10.1177/1534508416670367

Deci, E.L., & Ryan, R.M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian Psychology, 49*(3), 182-185.

Degol, J.L., Wang, M.T., Zhang, Y., & Allerton, J. (2017). Do growth mindsets in math benefit females? Identifying pathways between gender, mindset, and motivation. *Journal of Youth and Adolescence, 47*(5), 976-990.

Dev, P.C. (1997). Intrinsic motivation and academic achievement: What does their relationship imply for the classroom teacher? *Remedial and Special Education, 18*(1), 12-19.

Dixson, D.D., Worrell, F.C., Olszewski-Kubilius, P., & Subotnik, R.F. (2016). Beyond perceived ability: The contribution of psychosocial factors to academic performance. *New York Academy of Sciences, 1377*(1), 67-77. doi: 10.1111/nyas.13210

Dockterman, D., & Blackwell, L. (2014). Growth mindset in context: Content and culture matter too. *International Center for Leadership in Education.* Retrieved from www.leadered.com/pdf/GrowthMindset.pdf

Duckor, B. (2017). Got grit? Maybe… *Phi Delta Kappan, 98*(7), 61-66. doi: 10.1177/0031721717702634

Duckworth, A.L. (2016). *Grit: The power of passion and perseverance.* New York: Scribner.

Duckworth, A., & Gross, J.J. (2014). Self-control and grit: Related but separable determinants of success. *Current Directions in Psychological Science, 23*(5), 319-325. doi: 10.1177/0963721414541462

Duckworth, A.L., Peterson, C., Matthews, M.D., & Kelly, D.R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology, 92*, 1087-1101. doi: 10.1037/0022-3514.92.6.1087

Duckworth, A.L., & Quinn, P.D. (2009). Development and validation of the Short Grit Scale (Grit-S). *Journal of Personality Assessment, 91*(2), 166-174.

Dull, R.B., Schleifer, L.F., & McMillan, J.J. (2015). Achievement goal theory: The relationship of accounting students' goal orientations with self-efficacy, anxiety, and achievement. *Accounting Education: An International Journal, 24*(2), 152-174.

Dweck, C.S. (2000). *Self-theories: Their role in motivation, personality and development.* Taylor & Francis: Philadelphia, PA.

Dweck, C.S. (2006). *Mindset*: *The new psychology of success.* New York: Random House.

Dweck, C.S. (2007). The perils and promises of praise. *Educational Leadership, 65*(2), 34-39.

Dweck, C.S. (2010). Even geniuses work hard. *Educational Leadership, 68*(1), 16-20.

Dweck, C.S. (2012). Mindsets and malleable minds: Implications for giftedness and talent. In R. Subotnik, A. Robinson, C. Callahan, P. Johnson, & E.J. Grubbins (Eds.). *Malleable Minds: Translating Insights from Psychology and Neurosciences to Gifted Education.* (pp. 7-18). Storrs: National Research Center on the Gifted and Talented, University of Connecticut.

Dweck, C.S. (2017). The journey to children's mindsets – and beyond. *Child Development Perspectives, 11*(2), 139-144.

Dweck, C.S., Chiu, C., & Hong, Y. (1995b). Implicit theories: Elaboration and extension of the model. *Psychological Inquiry, 6*, 322-333.

Dweck, C.S., & Leggett, E.L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review, 95*(2), 256-273. doi: 10.1037/033-295X.95.2.256

Else-Quest, N.M., Mineo, C.C., & Higgins, A. (2013). Math and science attitudes and achievement at the intersection of gender and ethnicity. *Psychology of Women Quarterly, 37*, 293-309.

Esparza, J., Shumow, L., & Schmidt, J.A. (2014). Growth mindset of gifted seventh grade students in science. *NCSSSMST Journal, 19*(3), 6-13.

Fehrenbach, C.R. (1993). Underachieving gifted students: Intervention programs that work. *Roeper Review, 16*(2), 88.

Field, A.P. (2009). *Discovering statistics using SPSS: (and sex and drugs and rock 'n' roll).* Thousand Oaks, CA: Sage.

Fletcher, K.L., & Speirs Neumeister, K.L. (2012). Research on perfectionism and achievement motivation: Implications for gifted students. *Psychology in the Schools, 49*(7), 668-677. doi: 10.1002/pits.21623

Fowler, F.J. (2014). *Survey research methods* (5th ed.). Thousand Oaks, CA: Sage.

Froiland, J.M., & Worrell, F.C. (2016). Intrinsic motivation, learning goals, engagement, and achievement in a diverse high school. *Psychology in the Schools, 53*(3), 321-336. doi: 10.1002/pits.21901

Gallagher, S., & Gallagher, J. (n.d.). Using problem-based learning to explore unseen academic potential. *The Interdisciplinary Journal of Problem-Based Learning, 7*(1). doi: 10.7771/1541-5015.1322

Garland, R. (1991). The mid-point on a rating scale: Is it desirable? *Marketing Bulletin, 2,* 66-70.

Golden, N.A. (2015). "There's still that window that's open": The problem with "grit". *Urban Education, 52*(3), 343-369. doi: 10.1177/0042085915613557

Gottfried, A.E., & A.W. Gottfried. (1996). A longitudinal study of academic intrinsic motivation in intellectually gifted: Childhood through early adolescence. *Gifted Child Quarterly, 40*(4), 179-183.

Gottfried, A.E. (2008). Home environment and academic intrinsic motivation. *Encyclopedia of Educational Psychology, 1,* 485-490.

Grant, H., & Dweck, C.S. (2003). Clarifying achievement goals and their impact. *Journal of Personality and Social Psychology, 85*(3), 541-553. doi: 10.1037/0022-3514.85.3.541

Gravetter, F.J., & Wallnau, L.B. (2013). *Statistics for the behavioral sciences*. Belmont, CA: Wadsworth.

Haimovitz, K., & Dweck, C.S. (2017). The origins of children's growth and fixed mindsets: New research and a new proposal. *Child Development, 88*(6), 1849-1859.

Hareli, S., & Weiner, B. (2002). Social emotion and personality inferences: A scaffold for a new direction in the study of achievement motivation. *Educational Psychologist, 37*(3), 183-193.

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research, 77*(1), 81-112.

Indiana Department of Education. (2017). *School corporation high ability report card 2016 data*. Retrieved from file:///C:/Users/Owner/Downloads/7855Lafayette2016.pdf

King, R.B., McInerney, D.M., & Nasser, R. (2017). Different goals for different folks: A cross-cultural study of achievement goals across nine cultures. *Social Psychology of Education, 20*(3), 619-642. doi: 10.1007/s11218-017-9381-2

Lai, C., Hwang, G., & Tu, Y. (2018). The effects of computer-supported self-regulation in science inquiry on learning outcomes, learning processes, and self-efficacy. *Educational Technology Research and Development, 66*(4), 863-892. doi: 10.1007/s11423-018-9585-y

Lam, S., Yim, P., & Ng, Y. (2008). Is effort praise motivational? The role of beliefs in the effort-ability relationship. *Contemporary Educational Psychology, 33*(4), 694-710. doi: 10.1016/j.cedpsych.2008.01.005

Landis, R.N., & Reschly, A.L. (2013). Reexamining gifted underachievement and dropout through the lens of student engagement. *Journal for the Education of the Gifted, 36*(2), 220-249. doi: 10.1177/0162353213480864

Li, Y., & Bates, T. (2017). Does mindset affect children's ability, school achievement, or response to challenge? Three failures to replicate. *Unpublished manuscript.* Retrieved from https://osf.io/preprints/socarxiv/tsdwy/download.

Makel, M.C., Snyder, K.E., Thomas, C., Malone, P.S., & Putallaz, M. (2015). Gifted students' implicit beliefs about intelligence and giftedness. *Gifted Child Quarterly, 59*(4), 203-212. doi: 10.1177/0016986215

Marsh, H.W., & Craven, R.G. (1994). *School Motivation Questionnaire*. University of Western Sydney: Authors.

Martin, A.J., & Dowson, M. (2009). Interpersonal relationships, motivation, engagement, and achievement: Yields for theory, current issues, and educational practice. *Review of Educational Research, 79*(1), 327-365. doi: 10.3102/0034654308325583

McCoach, D.B., & Siegle, D. (2003). Factors that differentiate underachieving gifted students from high-achieving gifted students. *Gifted Child Quarterly, 47*(2), 144-154. doi: 10.1177/001698620304700205

McGeown, S., Putwain, D., St. Clair-Thompson, H., & Clough, P. (2016). Understanding and supporting adolescents' mental toughness in an education context. *Psychology in the Schools, 54*(2), 196-209. doi: 10.1002/pits.21986

Mega, C., Ronconi, L., & De Beni, R. (2013). What makes a good student? How emotions, self-regulated learning, and motivation contribute to academic achievement. *Journal of Educational Psychology, 106*(1), 121-131. doi: 10.1037/a0033546

Mofield, E.L., & Parker Peters, M. (2018). Mindset misconception? Comparing mindsets, perfectionism, and attitudes of achievement in gifted, advanced, and typical students. *Gifted Child Quarterly, 62*(4), 327-349.

Mueller, C.M., & Dweck, C.S. (1998). Praise for intelligence can undermine children's motivation and performance. *Journal of Personality and Social Psychology, 75*(1), 33-52.

Muenks, K., & Miele, D.B. (2017). Students' thinking about effort and ability: The role of developmental, contextual, and individual difference factors. *Review of Educational Research,* 1-29. doi: 10.2102/0034654316689328

Nagaoka, J., Farrington, C.A., Roderick, M., Allensworth, E., Keyes, T.S. Johnson, D.W., & Beechum, N.O. (2013). Readiness for college: The role of noncognitive factors and context. *Voices in Urban Education, 38*, 45-52.

National Association for Gifted Children. (2010). *Pre-K to Grade 12 Gifted Standards.* Retrieved from http://www.nagc.org/sites/default/files/standards/K-12%20programming%20standards.pdf

Northwest Evaluation Association. (2017). *Linking the Indiana ISTEP+ assessments to NWEA MAP Growth Tests.* Retrieved from https://www.nwea.org/content/uploads/2017/02/IN-MAP-Growth-Linking-Study-Report-2017.pdf

Obergriesser, A., & Stoeger, H. (2015). The role of emotions, motivation, and learning behavior in underachievement and results of an intervention. *High Ability Studies, 26*(1), 167-190. doi: 10.1080/13598139.2015.1043003

Ocak, G., & Yamac, A. (2013). Examination of the relationships between fifth graders' self-regulated learning strategies, motivational beliefs, attitudes, and achievement. *Educational Sciences: Theory and Practice, 13*(1), 380-387.

Olszewski-Kubulius, P.M., Kulieke, M.J., & Krasney, N. (1988). Personality dimensions of gifted adolescents: A review of empirical literature. *Gifted Child Quarterly, 32*(4), 347-352.

Pajares, F. (1996). Self-efficacy beliefs and mathematical problem-solving of gifted students. *Contemporary Educational Psychology, 21*(4), 325-344. doi: 10.1006/ceps.1996.0025

Pajares, F. (1997). Current directions in self-efficacy research. In M. Maeher & P. Pintrich (Eds.), *Advances in motivation and achievement* (Vol. 10, pp. 1-49). Greenwich, CT: JAI Press.

Pajares, F. (2003). Self-efficacy beliefs, motivation, and achievement in writing: A review of the literature. *Reading & Writing Quarterly, 19*, 139-158. doi: 10.1080/10573560390143085

Perkins-Gough, D. (2013). The Significance of GRIT. *Educational Leadership, 71*(1), 14-20.

Phan, H.P. (2012). Relations between informational sources, self-efficacy, and academic achievement: A developmental approach. *Educational Psychology, 32*(1), 81-105. doi: 10.1080/01443410.2011.625612

Phillips, N. & Lindsay, G. (2006). Motivation in gifted students. *High Ability Studies, 17*(1), 57-73. doi: 10.1080/13598130600947119

Rattan, A., Savani, K., Chugh, D., & Dweck, C.S. (2015). Leveraging mindsets to promote academic achievement: Policy recommendations. *Perspectives on Psychological Science, 10*(6), 721-726. doi: 10.1177/1745691615599383

Reis, S.M., & McCoach, D.B. (2000). The underachievement of gifted students: What do we know and where do we go? *Gifted Child Quarterly, 44*3), 152-170. doi: 10.1177/001698620004400302

Renzulli, J.S. (1986). The three-ring conception of giftedness: A developmental model creative productivity. In R.J. Sternberg & J.E. Davidson (Eds.), *Conceptions of Conceptions of giftedness* (pp. 53-92). New York: Cambridge University Press.

Ricci, M.C. (2013). What are mindsets, and how do they affect the classroom? In Ricci, *Mindsets in the Classroom: Building a Culture of Success and Student Achievement in Schools* (pp. 1-11). Waco, TX: Prufrock Press.

Rimfeld, K., Kovas, Y., Dale, P.S., & Plomin, R. (2016). True grit and genetics: Predicting academic achievement from personality. *Journal of Personality and Social Psychology, 111*(5), 780-789. doi: 10.1037/pspp0000089

Rimm, S.B. (1997). An underachievement epidemic. *Educational Leadership, 54*(7), 18-22.

Ritchotte, J.A., Matthews, M.S., & Flowers, C.P. (2014). The validity of the achievement-orientation model for gifted middle school students: An exploratory study. *Gifted Child Quarterly, 58*(3), 183-198.

Robinson, A., & Clinkenbeard, P.R. (1998). Giftedness: An exceptionality examined. *Annual Review of Psychology, 49*, 117-139.

Rubenstein, L.D., Siegle, D., Reis, S.M., McCoach, D.B., & Burton, M.G. (2012). A complex quest: The development and research of underachievement interventions for gifted students. *Psychology in the Schools, 49*(7), 678-694. doi: 10.1002/pits021620

Rund, R.W. (2017). *Indiana school laws and rules*. Eagan, MN: Thomson Reuters.

Ryan, R.M., & Deci, E.L. (2000). Self-determination theory and the facilitation of intrinsic, social development, and well-being. *American Psychologist, 55*(1), 68-78. doi: 10.1037//0003-066X.55.1.68

Sadler, P.M., Sonnert, G., Hazari, Z., & Tai, R. (2012). Stability and volatility of STEM career interest in high school: A gender study. *Science in Education, 96*(3), 411-427.

Schunk, D.H. (1996, April). *Attributions and the development of self-regulatory competence.* Paper presented at the annual meeting of American Educational Research Association, New York.

Schunk, D.H., & Zimmerman, B.J. (2007). Influencing children's self-efficacy and self-regulation of reading and writing through modeling. *Reading & Writing Quarterly, 23*(1), 7-25.

Siegle, D., & McCoach, D.B. (2005). Making a difference: Motivating gifted students who are not achieving. *Teaching Exceptional Children, 38*(1), 22-27.

Sisk, V.F., Burgoyne, A.P., Sun, J., Butler, J.L., & Macnamara, B.N. (2018). To what extent and under which circumstances are growth mind-sets important to academic achievement? Two meta-analyses. *Psychological Science, 29*(4), 549-571.

Snyder, K.E., Barger, M.M., Wormington, S.V., Schwartz-Bloom, R., & Linnenbrink-Garcia, L. (2013). Identification as gifted and implicit beliefs about intelligence: An examination of potential moderators. *Journal of Advanced Academies, 24*(4), 242-258. doi: 10.1177/1932202X13507971

Spector, P.E. (1992). *Summated rating scale construction: An introduction*. Newbury Park, CA: Sage.

Stokas, A.G. (2015). A genealogy of grit: Education in the new gilded age. *Educational Theory, 65*(5), 513-528. doi: 10.111/edth.12130

Stolzenberg, R.M. (2004). Multiple regression analysis. In M. Hardy & A. Bryman, *Handbook of data analysis* (pp. 165-208). Thousand Oaks, CA: Sage.

U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), *Public School Teacher Data File*, (2011-12). Retrieved from http://nces.ed.gov/surveys/sass/tables/sass1112_2013314_t1s_002.asp

Usher, E.L. (2009). Source of middle school students' self-efficacy in mathematics: A qualitative investigation. *American Educational Research Journal, 46*(1), 275-314. doi: 10.3102/0002831208324517

Van DeWeghe, R. (2003). Students' views of intelligence, teacher's praise, and achievement. *The English Journal, 93*(2), 70-74.

Van Tassel-Baska, J. (2000). Curriculum policy development for secondary gifted programs: A prescription for reform coherence. *National Association of Secondary School Principals, 84*(15), 14-29.

Wang, C.W., & Neihart, M. (2015). Academic self-concept and academic self-efficacy: Self-beliefs enable academic achievement of twice-exceptional students. *Roeper Review, 37*(2), 63-73. doi: 10.1080/02783193.2015.1008660

Wang, K.T., Fu, C.C., & Rice, K.G. (2012). Perfectionism in gifted students: Moderating effects of goal orientation and contingent self-worth. *School Psychology Quarterly, 27*(2), 96-108. doi: 10.1037/a0029215

What is giftedness? (n.d.). Retrieved January 22, 2018, from National Association for Gifted Children website: http://www.nagc.org

Wolters, C.A. (2004). Advancing achievement goal theory: Using goal structures and goal orientations to predict students' motivation, cognition, and achievement. *Journal of Educational Psychology, 96*(2), 236-250.

Wolters, C.A., & Hussain, M. (2015). Investigating grit and its relations with college students' self-regulated learning and academic achievement. *Metacognition and Learning 10*(3), 293-311.

Yeager, D.S., & Dweck, C.S. (2012). Mindsets that promote resilience: When students believe personal characteristics can be developed. *Educational Psychologist, 47*(4), 302-314. doi: 10.1080/00461520.2012.722805

Yeager, D.S. & Walton, G.M. (2011). Social-psychological interventions in education: They're not magic. *Review of Educational Research, 81*, 267-301.

Appendix A

High Ability Coordinator Recruitment Letter

NON-COGNITIVE ATTRIBUTES AS PREDICTORS OF HIGH ABILITY STUDENTS'ACADEMIC ACHIEVEMENT

Dear High Ability Coordinator:

My name is Alicia Clevenger. I am interested in learning more about non-cognitive attributes, teacher feedback, and instructional practices and how those predict academic achievement in high ability students. I am completing my doctoral degree with Ball State University. If you are willing, I would like for a few of your teachers and high ability students to be in my study.

Your participation in my study will include your support and provide names of high ability teachers who will administer a survey to their students in grades 4 through 8. I will be collecting information from students using an online survey in order to understand their perceptions of growth mindset and grit. Also, your support will include allowing me to survey teachers using an online format. This will give me the opportunity to learn more about their perceptions of teacher feedback and instructional practices. The focus of my study is to determine what non-cognitive attributes of high ability students predict academic achievement. Additionally, I want to know what effects teacher feedback and instructional practices have on high ability students' willingness to take risks when faced with academic challenges.

The purpose of this study is to investigate what non-cognitive attributes of high ability students most predict academic achievement. Specifically, this study will analyze the relationship between growth mindset, grit, teacher feedback, and instructional practices and high ability students' academic achievement. The data will be reported in a manner using a regression analysis so that student and teacher perceptions may be quantified. All data collected and gathered will remain confidential. Pseudonyms will be used in place of your teachers' names and students' names to maintain confidentiality.

For questions about your rights in participating in this study, please contact Director, Office of Research Integrity, Ball State University, Muncie, Indiana, 47306, (765) 285-5070, irb@bsu.edu.

If you have any questions, please contact me or Dr. Marilynn Quick at mquick@bsu.edu.

Thank you,

Researcher Contact Information:
Principal Investigator:
Alicia J. Clevenger, Doctoral Student
Department of Educational Leadership
Ball State University
Muncie, IN 47306
Telephone: (765) 237-8228
Email: ajclevenger@bsu.edu

Appendix B

High Ability Teacher Recruitment Letter

NON-COGNITIVE ATTRIBUTES AS PREDICTORS OF HIGH ABILITY STUDENTS'ACADEMIC ACHIEVEMENT

Dear Teacher:

My name is Alicia Clevenger. I am interested in learning more about non-cognitive attributes, teacher feedback, and instructional practices and how those predict academic achievement in high ability students. I am completing my doctoral degree with Ball State University. If you are willing, I would like for a few of your teachers and high ability students to be in my study.

If you decide to participate in my study, then you will agree to administer an online survey to your students (not during ISTEP+ testing times). Also, you will take an online survey so I can learn more about how you perceive teacher feedback and common instructional practices. The focus of my study is to determine what non-cognitive attributes of high ability students predict academic achievement. Additionally, I want to know what effects teacher feedback and instructional practices have on high ability students' willingness to take risks when faced with academic challenges.

The purpose of this study is to investigate what non-cognitive attributes of high ability students most predict academic achievement. Specifically, this study will analyze the relationship between growth mindset, grit, teacher feedback, and instructional practices and high ability students' academic achievement. The data will be reported in a manner using a regression analysis so that student and teacher perceptions may be quantified. All data collected and gathered will remain confidential. Pseudonyms will be used in place of your teachers' names and students' names to maintain confidentiality.

For questions about your rights in participating in this study, please contact Director, Office of Research Integrity, Ball State University, Muncie, Indiana, 47306, (765) 285-5070, irb@bsu.edu.

If you have any questions, please contact me or Dr. Marilynn Quick at mquick@bsu.edu.

Thank you,

Researcher Contact Information:
Principal Investigator:
Alicia J. Clevenger, Doctoral Student
Department of Educational Leadership
Ball State University
Muncie, IN 47306
Telephone: (765) 237-8228
Email: ajclevenger@bsu.edu

Appendix C

Informed Consent Form for Teachers

Study Title: NON-COGNITIVE ATTRIBUTES AS PREDICTORS OF HIGH ABILITY STUDENTS'ACADEMIC ACHIEVEMENT

Study Purpose and Rationale: The purpose of this study is to determine what non-cognitive attributes predict the academic achievement and the willingness to take academic risks of identified high ability students in fourth through eighth grades while controlling for the intervening variables of teacher feedback and instructional practices. The rationale for this research can be classified into two categories: scholarly research and instructional practice in the area of high ability education. Examining the non-cognitive attributes of high ability students will be beneficial in a number of ways. The significance includes: (1) a contribution to needed research specifically regarding non-cognitive attributes of high ability students; (2) potential data for reducing underachievement in high ability students, which is of concern to high ability educators; and (3) implications for instructional practice that promote non-cognitive attributes.

Inclusion/Exclusion Criteria: You are being selected because you teach a group of identified high ability students between grades 4 through 8. Your high ability coordinator has indicated his/her support for your participation.

Participation Procedures and Duration: Participants have the right to participate or not. If you agree to participate in the study, the principal investigator, Alicia Clevenger, will send you a link to the online survey for students for you to administer and another link for you to complete the teacher portion of the online survey. Data will be coded so as to protect each participant's confidentiality. Teachers will use the list of student codes provided by the principal investigator and type a code on each student survey. For example, a student may have a code of T1S3 (Teacher 1, Student 3). The researcher will have a master list that indicates T1S3 is equal to a student identification number, which can be electronically linked. These student numbers will be randomized to protect students' confidentiality. These codes will then be linked to students' NWEA achievement scores that the teacher will provide to the principal investigator. The study will be conducted during a period that the teacher finds suitable during the three-week survey window. Survey data will be automatically sent to the primary investigator and the teacher will send NWEA scores to the primary investigator by the completion of the three-week window.

Data Confidentiality: As explained above, data will be coded so that data remain confidential; therefore, identities will not be shared. Your school corporation and Ball State University will receive a copy of the final dissertation once the study is completed, but the identities of the respondents will not be known.

Storage of Data: During this research study, the list of teachers' names and their corresponding codes will be stored within the principal investigator's password-protected Qualtrics account as well as a password-protected MacBook and flash drive, which will be housed in a locked office. After data are coded and recorded, the list of teachers' names and their corresponding codes will

be shredded. Only the principal investigator and the advisor will have access to the raw data. The data will be kept no more than three years.

Risks or Discomforts: There are no anticipated risks for participating in this study.

Benefits and/or Compensation: There are no anticipated benefits or compensation for participating in this study.

Voluntary Participation: Your participation in this study is completely voluntary and you are free to withdraw your permission at any time for any reason without penalty or prejudice from the investigator. Please feel free to ask any questions of the investigator before signing this form and at any time during the study.

IRB Contact Information: For questions about your rights as a research subject, please contact Director, Office of Research Integrity, Ball State University, Muncie, Indiana 47306, (765) 285-5070, irb@bsu.edu.

Study Title: NON-COGNITIVE ATTRIBUTES AS PREDICTORS OF HIGH ABILITY STUDENTS'ACADEMIC ACHIEVEMENT

Principal Investigator: Alicia Clevenger, Ball State University Student, ajclevenger@bsu.edu, (765) 237-8228 (cell).

Consent:

I, _____, agree to participate in this research project titled, "NON-COGNITIVE ATTRIBUTES AS PREDICTORS OF HIGH ABILITY STUDENTS'ACADEMIC ACHIEVEMENT". I have had the study explained to me and my questions have been answered to my satisfaction. I have read the description of this project and give my consent to participate. I understand that I will receive a copy of this informed consent to keep for future reference.

To the best of my knowledge, I meet the inclusion/exclusion criteria for participation (described on the previous page) in this study.

_____ _____

Participant Signature Date

Researcher Contact Information:

Principal Researcher:
Alicia Clevenger, Doctoral Student
Department of Educational Leadership
Ball State University
Muncie, IN 47306
Telephone: (765) 237-8228
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Faculty Supervisor: Supervisor:
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Appendix D

Spring 2018

Dear Parent,

I wanted to invite your child to participate in a brief survey that may help current and future high ability students. I am interested in learning more about their thoughts on "growth mindset" (the idea that talents can be developed) and "grit" (persevering towards a goal). My study seeks to identify how these two elements are related to classroom success with the goal of better understanding how teachers can harness their power at school. My results will be shared with leaders in your child's school district.

I have attached a parental consent form that goes into greater detail about the nuts and bolts of this study. Please know that your child's responses will be completely confidential. There is also a consent form for your student to sign. Both forms must be completed in order for your student to lend their thoughts to this brief survey.

Thank you for your consideration!

Sincerely,

Alicia Clevenger

Doctoral Student
Ball State University

Appendix E

Informed Consent Form for Parents

Study Title: NON-COGNITIVE ATTRIBUTES AS PREDICTORS OF HIGH ABILITY STUDENTS'ACADEMIC ACHIEVEMENT

Study Purpose and Rationale: The purpose of this study is to determine what non-cognitive attributes predict the academic achievement and the willingness to take academic risks of identified high ability students in fourth through eighth grades while controlling for the intervening variables of teacher feedback and instructional practices. The rationale for this research can be classified into two categories: scholarly research and instructional practice in the area of high ability education. Examining the non-cognitive attributes of high ability students will be beneficial in a number of ways. The significance includes: (1) a contribution to needed research specifically regarding non-cognitive attributes of high ability students; (2) potential data for reducing underachievement in high ability students, which is of concern to high ability educators; and (3) implications for instructional practice that promote non-cognitive attributes.

Inclusion/Exclusion Criteria: Your child is being selected because he/she is an identified high ability student in a grade level between 4 through 8.

Participation Procedures, Data Collection, and Duration of Study: You, as parents, must give your permission for your child to participate in this study that involves taking an online survey. The survey will ask your child to indicate their perceptions of growth mindset and grit. The survey should not take them more than 10 to 15 minutes.

Data Confidentiality or Anonymity: Your child's survey results are anonymous; therefore, his/her identity will not be shared. Your child's school corporation and Ball State University will receive a copy of the final dissertation once the study is completed, but there the identities of the respondents will not be known.

Storage of Data: Data will be stored within the principal investigator's password-protected Qualtrics account as well as a password-protected MacBook and flash drive, which will be housed in a locked office. After data are coded and recorded, the list of teachers' names and their corresponding codes will be shredded. Only the principal investigator and the advisor will have access to the raw data. The data will be kept no more than three years.

Risks or Discomforts: There are no anticipated risks for participating in this study.

Benefits and/or Compensation: There are no anticipated benefits or compensation for participating in this study.

Voluntary Participation: Participation in this study is completely voluntary and participants are free to withdraw permission at any time for any reason without penalty or prejudice from the investigator. Please feel free to ask any questions of the investigator before signing this form and at any time during the study.

IRB Contact Information: For questions about your rights as a research subject, please contact Director, Office of Research Integrity, Ball State University, Muncie, Indiana 47306, (765) 285-5070, irb@bsu.edu.

Study Title: NON-COGNITIVE ATTRIBUTES AS PREDICTORS OF HIGH ABILITY STUDENTS'ACADEMIC ACHIEVEMENT

Principal Investigator: Alicia Clevenger, Ball State University Student, ajclevenger@bsu.edu, (765) 237-8228 (cell).

Parental Consent:

I give my permission for my child, _____, to participate in this research project titled, "NON-COGNITIVE ATTRIBUTES AS PREDICTORS OF HIGH ABILITY STUDENTS'ACADEMIC ACHIEVEMENT". I have had the study explained to me and my questions have been answered to my satisfaction. I have read the description of this project and give my permission for my child to participate. I understand that I will receive a copy of this informed consent form to keep for future reference.

_____ _____

Parent's/Guardian's Signature Date

Researcher Contact Information:

Principal Researcher:
Alicia Clevenger, Doctoral Student
Department of Educational Leadership
Ball State University
Muncie, IN 47306
Telephone: (765) 237-8228
Email: ajclevenger@bsu.edu

Faculty Supervisor:
Dr. Marilynn Quick
Department of Educational Leadership
Ball State University
Muncie, IN 47306
Telephone: (763) 285-3287
Email: mquick@bsu.edu

Appendix F

Informed Consent Form for Students

NON-COGNITIVE ATTRIBUTES AS PREDICTORS OF HIGH ABILITY STUDENTS'ACADEMIC ACHIEVEMENT

My name is Alicia Clevenger. I am interested in learning more about non-cognitive attributes, teacher feedback, and instructional practices and how those predict academic achievement in high ability students. If you are willing, I would like for you to be in my study by completing an online survey about growth mindset and grit. The survey should take you about 10 to 15 minutes to complete.

Other people will not know if you are in my study. I will put the information I learn about you together with details I learn about other students who are identified as high ability so no one can tell what survey answers came from you. When I tell other people about my research, I will not use your name.

Your parent or guardian had to give permission for you to be in the study since you are under 18 years of age. Now you get to choose if you want to participate. If you don't want to be in the study, that is perfectly fine and no one will be upset with you. If you want to be in the study now and change your mind later, that is okay. You may stop the survey at any time. If you decide to not be a part of the study at any time, then this **will not** cause a problem for you at school.

I will give you a copy of this form in case you want to ask questions later.

Agreement:

My parent has signed a parental consent form allowing me to be in this study. I have decided to be in the study even though I know I do not have to do it. I will complete the anonymous online survey. Alicia Clevenger has answered all of my questions.

_____ _____

Signature of Participant Date

_____ _____

Signature of Researcher Date

Appendix G

Survey Instrument for Students

This survey is to be taken by identified high ability students in grades 4 through 8 based upon their perceptions concerning four non-cognitive attributes.

Demographics

1. I am in _____ grade. (Students will choose 4^{th}, 5^{th}, 6^{th}, 7^{th}, or 8^{th})
2. I am female/male. (Students will choose one)
3. Ethnicity: White Black Hispanic Multi-Racial Asian/Pacific Islander American Indian Native Hawaiian or Other Pacific Islander

Growth Mindset

This part of the survey has been designed to investigate ideas about intelligence. **There are no right or wrong answers**. The surveyor is interested in your ideas. Using the scale, please indicate the extent to which you agree or disagree with each of the following statements.

1. You have a certain amount of intelligence, and you cannot really do much to change it.

1. Strongly disagree 2. Disagree 3. Neither disagree nor agree 4. Agree 5. Strongly agree

2. Your intelligence is something about you that you cannot change very much.

1. Strongly disagree 2. Disagree 3. Neither disagree nor agree 4. Agree 5. Strongly agree

3. No matter who you are, you can significantly change your intelligence level.

1. Strongly disagree 2. Disagree 3. Neither disagree nor agree 4. Agree 5. Strongly agree

4. To be honest, you cannot really change how intelligent you are.

1. Strongly disagree 2. Disagree 3. Neither disagree nor agree 4. Agree 5. Strongly agree

5. You can always substantially change how intelligent you are.

1. Strongly disagree 2. Disagree 3. Neither disagree nor agree 4. Agree 5. Strongly agree

6. You can learn new things, but you cannot really change your basic intelligence.

1. Strongly disagree 2. Disagree 3. Neither disagree nor agree 4. Agree 5. Strongly agree

7. No matter how much intelligence you have, you can always change it quite a bit.

1. Strongly disagree 2. Disagree 3. Neither disagree nor agree 4. Agree 5. Strongly agree

8. You can change even your basic intelligence level considerably.

1. Strongly disagree 2. Disagree 3. Neither disagree nor agree 4. Agree 5. Strongly agree

Grit

This portion of the survey has a number of statements that may or may not apply to you. When responding, think of how you compare to most people – not just the people you know well, but most people in the world. **There are no right or wrong answers, so just answer honestly**.

9. New ideas and projects sometimes distract me from previous ones.

1. Strongly disagree 2. Disagree 3. Neither disagree nor agree 4. Agree 5. Strongly agree

10. Setbacks do not discourage me.

1. Strongly disagree 2. Disagree 3. Neither disagree nor agree 4. Agree 5. Strongly agree

11. I have been obsessed with a certain idea or project for a short time but later lost interest.

1. Strongly disagree 2. Disagree 3. Neither disagree nor agree 4. Agree 5. Strongly agree

12. I am a hard worker.

1. Strongly disagree 2. Disagree 3. Neither disagree nor agree 4. Agree 5. Strongly agree

13. I often set a goal but later choose to pursue a different one.

1. Strongly disagree 2. Disagree 3. Neither disagree nor agree 4. Agree 5. Strongly agree

14. I have difficulty maintaining focus on projects that take more than a few months to complete.

1. Strongly disagree 2. Disagree 3. Neither disagree nor agree 4. Agree 5. Strongly agree

15. I finish whatever I begin.

1. Strongly disagree *2. Disagree* *3. Neither disagree nor agree* *4. Agree*

5. Strongly agree

16. I am diligent.

1. Strongly disagree *2. Disagree* *3. Neither disagree nor agree* *4. Agree*

5. Strongly agree

Appendix H

Survey Instrument for Teachers

This survey is to be taken by teachers who teach identified high ability students in grades 4 through 8 based upon their perceptions concerning teacher feedback and instructional practices including student self-regulation and goal setting.

Demographics

1. Grade taught: _____
2. Subject taught: _____ Language Arts _____ Math
3. Years of teaching experience

__ 0-2 years __ 3-5 years __6-10 years __ 11-15 years __16-20 years __ 20+ years

4. School setting: ___ Rural ___ Suburban ___ Urban
5. Gender: ___ Male ____ Female

Teacher Feedback ***(This refers to the messages that students receive from teachers that may include intelligence praise or process praise.)***

1. I continually persist in helping all of my students academically achieve.

1. Never 2. Seldom 3. Sometimes 4. Often 5. Almost Always

2. I use process feedback to students that may include a statement such as, "I like the way you tried all kinds of strategies on that math problem until you finally got it."

1. Never 2. Seldom 3. Sometimes 4. Often 5. Almost Always

3. I consistently provide feedback to my students that relates to their learning goals.

1. Never 2. Seldom 3. Sometimes 4. Often 5. Almost Always

4. I provide feedback that is specific.

1. Never 2. Seldom 3. Sometimes 4. Often 5. Almost Always

5. I write more than just a grade/score at the top of students' assignments.

1. Never 2. Seldom 3. Sometimes 4. Often 5. Almost Always

Student Self-regulation ***(This refers to the process by which students control their own behaviors, cognition, and motivation.)***

6. I constantly promote student self-regulated learning in my classroom.

1. Never 2. Seldom 3. Sometimes 4. Often 5. Almost Always

7. I regularly coach students on how to cope with the difficulties they may face in my classroom in becoming more self-regulated.

1. Never 2. Seldom 3. Sometimes 4. Often 5. Almost Always

8. I model self-regulation strategies in my classroom.

1. Never 2. Seldom 3. Sometimes 4. Often 5. Almost Always

9. I frequently couple self-regulated learning strategies with quality feedback.

1. Never 2. Seldom 3. Sometimes 4. Often 5. Almost Always

10. I find that my students tend to be more motivated when using self-regulated learning.

1. Never 2. Seldom 3. Sometimes 4. Often 5. Almost Always

Goal Setting ***(This refers to the amount of time teachers spend with students on their individual goal setting.)***

11. I take the time to set goals with each student in my classroom.

1. Never 2. Seldom 3. Sometimes 4. Often 5. Almost Always

12. I continually monitor the progress my students are making toward their individual goals.

1. Never 2. Seldom 3. Sometimes 4. Often 5. Almost Always

13. I conference weekly with my students regarding their progress toward their individual goals.

1. Never 2. Seldom 3. Sometimes 4. Often 5. Almost Always

14. I see my students set goals that mirror the effort they put forth to achieve those goals.

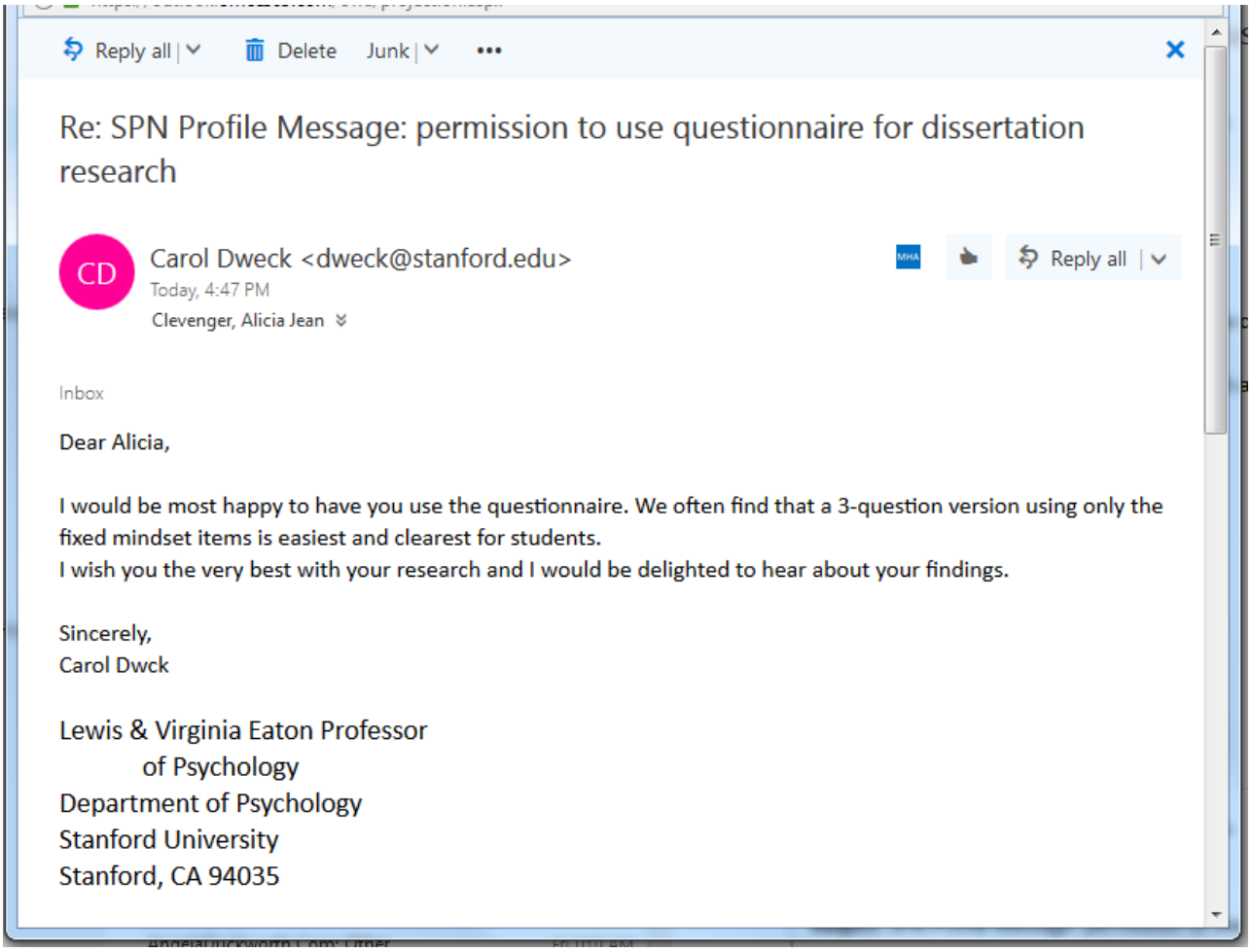
1. Never 2. Seldom 3. Sometimes 4. Often 5. Almost Always

15. I continually provide feedback to my students to keep them on track of meeting their goals.

1. Never 2. Seldom 3. Sometimes 4. Often 5. Almost Always

Appendix I

Survey Instrument Permissions



Reply all | Delete Junk | •••

Re: SPN Profile Message: permission to use questionnaire for dissertation research

CD Carol Dweck <dweck@stanford.edu>
Today, 4:47 PM
Clevenger, Alicia Jean

Reply all

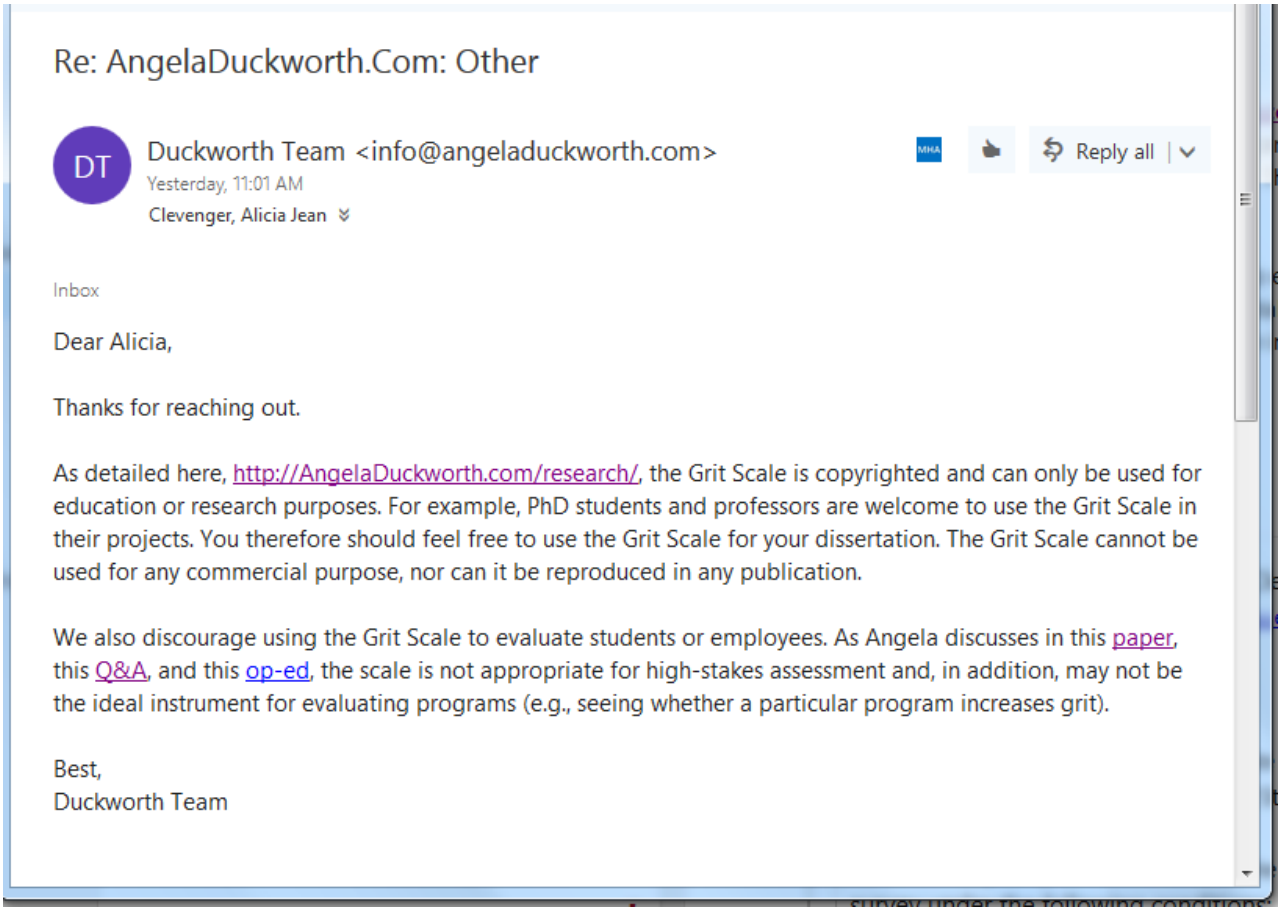
Inbox

Dear Alicia,

I would be most happy to have you use the questionnaire. We often find that a 3-question version using only the fixed mindset items is easiest and clearest for students.
I wish you the very best with your research and I would be delighted to hear about your findings.

Sincerely,
Carol Dwck

Lewis & Virginia Eaton Professor
of Psychology
Department of Psychology
Stanford University
Stanford, CA 94035



Re: AngelaDuckworth.Com: Other

DT

Duckworth Team <info@angeladuckworth.com>

Yesterday, 11:01 AM

Clevenger, Alicia Jean

Reply all

Inbox

Dear Alicia,

Thanks for reaching out.

As detailed here, http://AngelaDuckworth.com/research/, the Grit Scale is copyrighted and can only be used for education or research purposes. For example, PhD students and professors are welcome to use the Grit Scale in their projects. You therefore should feel free to use the Grit Scale for your dissertation. The Grit Scale cannot be used for any commercial purpose, nor can it be reproduced in any publication.

We also discourage using the Grit Scale to evaluate students or employees. As Angela discusses in this paper, this Q&A, and this op-ed, the scale is not appropriate for high-stakes assessment and, in addition, may not be the ideal instrument for evaluating programs (e.g., seeing whether a particular program increases grit).

Best,
Duckworth Team